AVIATION WEEK

NOV. 29, 1954

50 CENTS

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CONSTANT SPEED DRIVES • AIRCRAFT ACCESSORIES

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Checking B. F. Goodrich heated rubber installation, Bell Model 47

Egg beater whips ice

HELICOPTERS used to be grounded in cold weather. Ice forming on their rotor blades added dangerous weight, kept the "egg beaters" from taking off on life-saving missions.

Electrically heated rubber — rubber with resistance wires in it like a heating pad—would get rid of the ice. But wouldn't it create the same problem the ice did? Wouldn't it pile too much weight on the rotor, too?

B. F. Goodrich, working with Bell and the Navy, went after the answers. They designed a set of specially shaped heated rubber boots to minimize weight and bulk. They fitted the boots snugly along practically the entire length of the rotor. The anti-icing system was put through more than 50 tests on Mt. Washington in temperatures from 29° to -14° F. In freezing rain. In snowstorms. For 30 days.

Test results proved the new heated rubber would fill the bill. Rotors were kept free of ice. "Egg beaters" could now fly in weather and regions they never could before. The biggest single obstacle to all-weather helicopter operations had been removed.

Product of B. F. Goodrich engineering and research, heated rubber has solved many an aircraft icing problem. Other B. F. Goodrich products for aviation include tires, wheels and brakes; Pneumatic De-Icers; Avtrim; inflatable seals; fuel and oil cells; Rivnuts; hose and other accessories. *The B.F.Goodrich Co., Aeronautical Sales, Akron, Ohio.*

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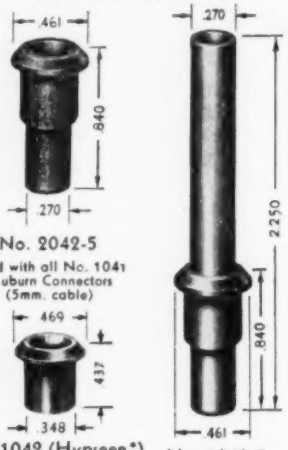
IGNITION ACCESSORIES

Terminal Collars (Seals)
Ozone Resistant Hypreen*



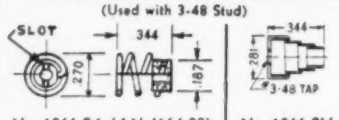
No. 2042-5
Used with all No. 1041 Auburn Connectors (5mm. cable)

No. 1042 (Hypreen*)
No. 1043 (Silicone)
Used with all No. 1041 Auburn Connectors (7mm. cable)

No. 1042-5
Used with all No. 1041 Auburn Connectors (5mm. cable)

*Auburn Synthetic Rubber

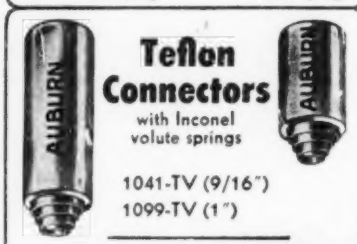
SPRING AND EYELET ASSEMBLIES
(Used with 3-48 Stud)



No. 1066-9A (AN 4164-22) with stainless steel coil springs

No. 1066-9V with Inconel volute springs

Teflon Connectors
with Inconel volute springs



1041-TV (9/16")
1099-TV (1")

Connectors with stainless steel coil springs

1041-C Steatite
1041-M Mycalex
1041-D Alumina
(AN 4164-2)

1099-C Steatite
1099-M Mycalex
1099-F Phenolic
1099-D Alumina
(AN 4164-1)

1041 1099

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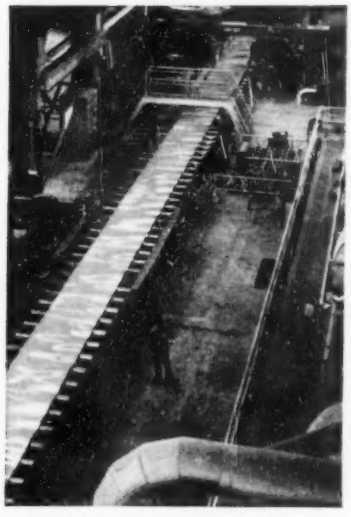
DOW

Many parts of Convair-Liner air frame made of Magnesium



Now in operation, tremendous new Dow facilities are geared to supply you with large quantities of sheet and plate at price reductions up to 25%.

Increased use of magnesium in high-speed commercial aircraft helps solve weight and rigidity problems

Thirty airlines the world over operate the CONVAIR-LINER—a high compliment to this ship's reliability and efficiency.

The designers of this ship specified magnesium for such air frame parts as the rudder skin, elevator skin, air ducts, rudder pedal quadrant, hydraulic oil tank—and others.

Magnesium, because it is one-third lighter than aluminum, has saved important pounds on this ship.

More and more designers are taking advantage of magnesium's light weight to increase torsional rigidity, simplify design and reduce fabricating costs for the aircraft industry.

Recent technical advances in alloying, fabricating and finishing have made magnesium a leading metal for aircraft construction. Write today for more information. THE DOW CHEMICAL COMPANY, Magnesium Sales Department, Midland, Michigan.

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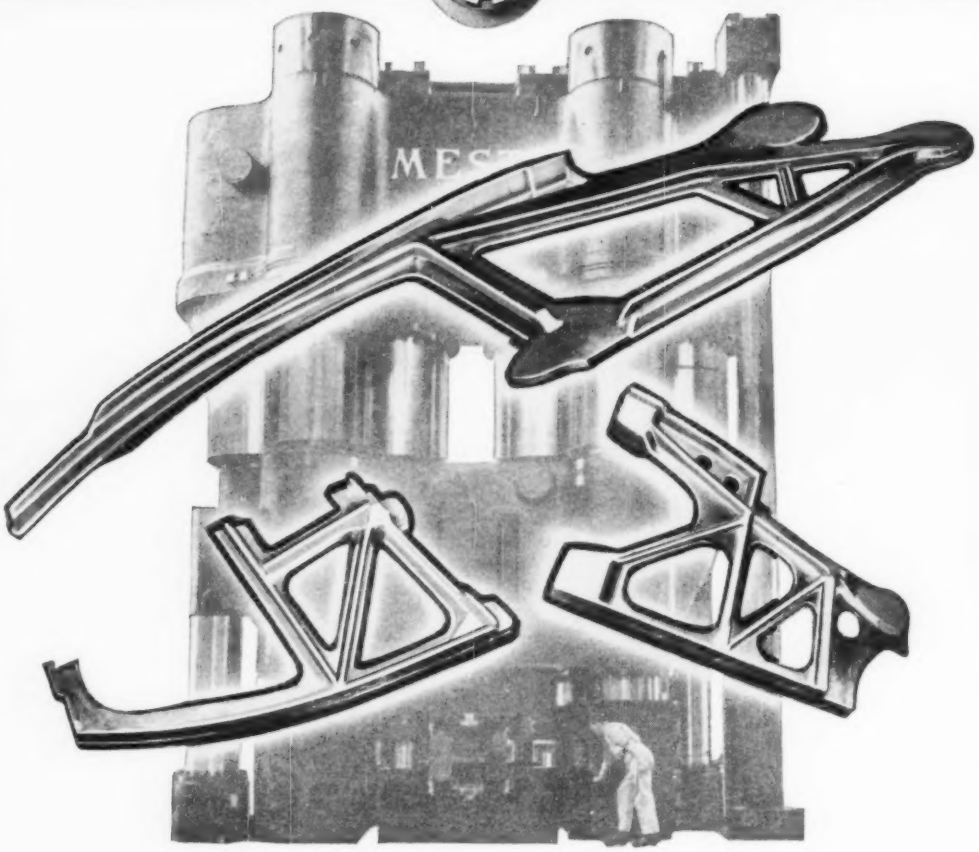

Greater Size and Speed in Aircraft have created engineering problems, the solution of which has required larger and larger forgings of high-strength aluminum alloy. *Examples* shown above are forged structural members used in a modern military bomber, the largest more than seven feet over all. These are forged on an 18,000 ton press, the biggest ever built in this country.

Wyman-Gordon Experience—the most extensive in the industry—is keeping abreast of new forging demands involving the use of Steel, Aluminum, Magnesium, High Density Alloys and Titanium.

• • •

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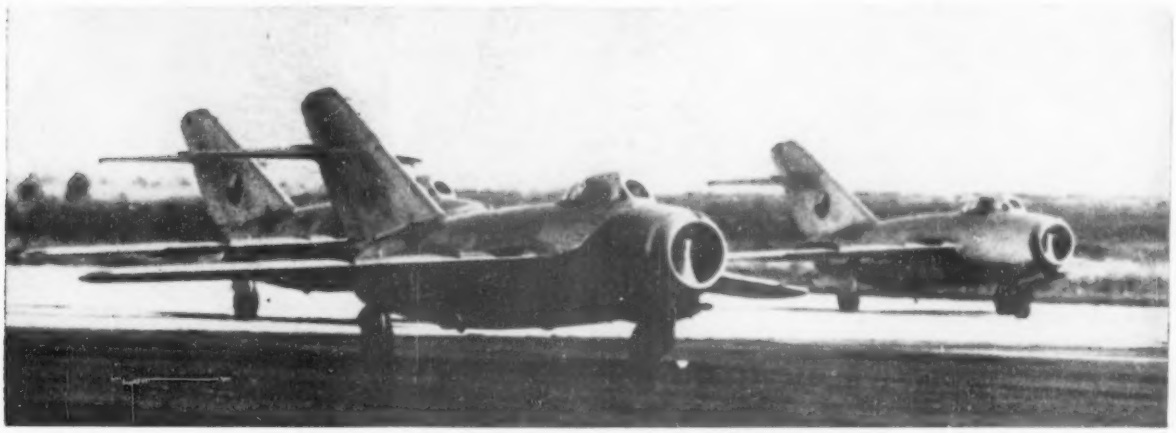
NEWS DIGEST



Czech Air Force Shows Its MiG-15 Jets

First view of Russian-designed MiG-15 single-seat jet fighters bearing Czechoslovak air force insignia is being distributed by the Communist-controlled news agency Eastfoto, following a display of the planes at a public air show in the satellite country. A flight demonstration by a number of the jet fighters is described as "the peak event of the day." These MiGs appear to incorporate modifications made on the early models as a result of combat experience in the Korean war. These include mass balances on the horizontal tail and beefed-up vertical tail. Russian satellite air forces are flying large numbers of the midwing MiGs, according to reports.

Domestic

Transition trainer, designated Martin B-57C and fitted with dual controls, has been ordered in quantity by USAF. First B-57C trainer is expected to fly in December. The twin-jet bomber trainer will have tandem seats.

Second Convair YC-131C, turboprop-powered USAF 340, has joined the first YC-131C at Edwards AFB, Calif., for tests. Both are powered by two 3,750-hp. Allison YT56-A-3s.

Col. Leon Booth, public information officer for Air Research and Development Command, Baltimore, moves to a new position in the Office of Public Information, Department of Defense, Feb. 10.

James Riddle, National Aeronautical Corp., Ambler, Pa., is new president of the Aviation Distributors & Manufacturers Assn.

Demand for "immediate public investigation" of two recent landing gear failures on American Airlines transports has been asked of Civil Aeronautics Board by James F. Horst, director of the Transport Workers Union Air Transport Division. Horst charges AA has made "unwarranted reductions in its maintenance personnel," resulting in "equipment breakdowns in flight."

Civil Aeronautics Administration is asking the 50,000 owners of U. S. small aircraft to check their heating systems every 25-50 hr., warning that exhaust manifold cabin heaters can take dangerous carbon monoxide gases into cabins of lightplanes if the exhaust manifold is perforated.

Kaman Aircraft Corp.'s production and maintenance employes have voted 410 to 127 against union representation by International Association of Machinists (AFL) at the company's Bloomfield, Conn., plant. The vote defeated bids by both AFL and CIO unions at Kaman for the third time in less than three years.

Clyde V. Cessna, 74, pioneer aircraft manufacturer and founder of Cessna Aircraft Co. at Wichita, died Nov. 20 at his farm near Rago, Kan.

Worldwide airport hotel chain will be started by Hyatt Robert von Dehn with the opening Dec. 2 of a $1.5-million, 69-room unit one-and-a-half miles from the main entrance of Los Angeles International Airport.

Financial

Northrop Aircraft, Inc., Hawthorne, Calif., estimates consolidated net income for the first quarter of its new fiscal year at $2,986,000, more than five times the $512,315 reported for the same period a year ago. Sales for the quarter ended Oct. 31 nearly doubled, climbing from $40,170,894 to $73,622,000. Backlog Oct. 31: approximately $430 million, dropping from $489 million July 31.

National Airlines' net income for the quarter ended Sept. 30 dropped to $65,095 from $173,243 for the same three months of last year. Total operating revenues were $9,226,226, compared with $7,532,623.

International

Cubana de Aviacion established a speed record of 7 hr., 20 min. on delivery flight of the first of its three 74-passenger Lockheed Super Constellations, from the builder's Burbank, Calif., plant to Jose Marti Airport, Havana.

Two Vickers Viscount 700D turboprop transports have been ordered by Hunting-Clan Air Transport, Ltd., bringing the British airline's total Viscount orders to five. There now are 157 Viscounts on order, with options on an additional 29.

Canadian aviation industry has topped the half-billion-dollar mark, according to Bureau of Statistics, making it the third largest employer in Canada in numbers of personnel, salaries and wages.

New insurance requirements for commercial air service operators have been established by Canadian Air transport Board. Minimums: $20,000 per seat for passenger liability for domestic and international service; public liability of $20,000 for one person and $40,000 total per plane; $5,000 property damage per airplane per accident.

as others see us . . .

A user tells how AETCO SERVICE helped him

by E. D. HOLLAND
Hydraulic Engineer
OZONE METAL PRODUCTS CO.

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"Since Ozone Metal Products Corporation specializes in the manufacture of precision hydraulic units, such as Control Surface Power Assemblies, etc., for the Aircraft Industry, we investigated and found that "Aetco" is recognized as a competent specialist in qualification-testing and reports. This finding supported our decision to utilize the facilities of "Aetco."

"That we are satisfied is evidenced by our using the transcript of "Aetco's" report verbatim. When the occasion arises again, we will utilize "Aetco's" facilities and experienced personnel for qualification tests."

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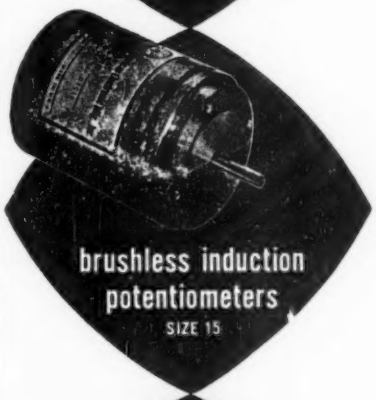

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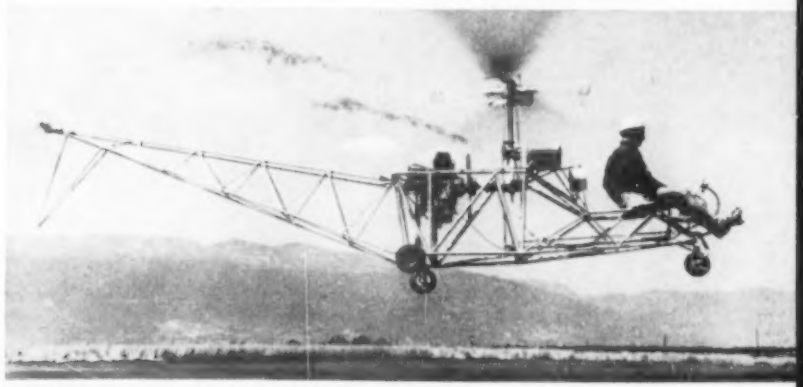
New Aircraft Here and Abroad

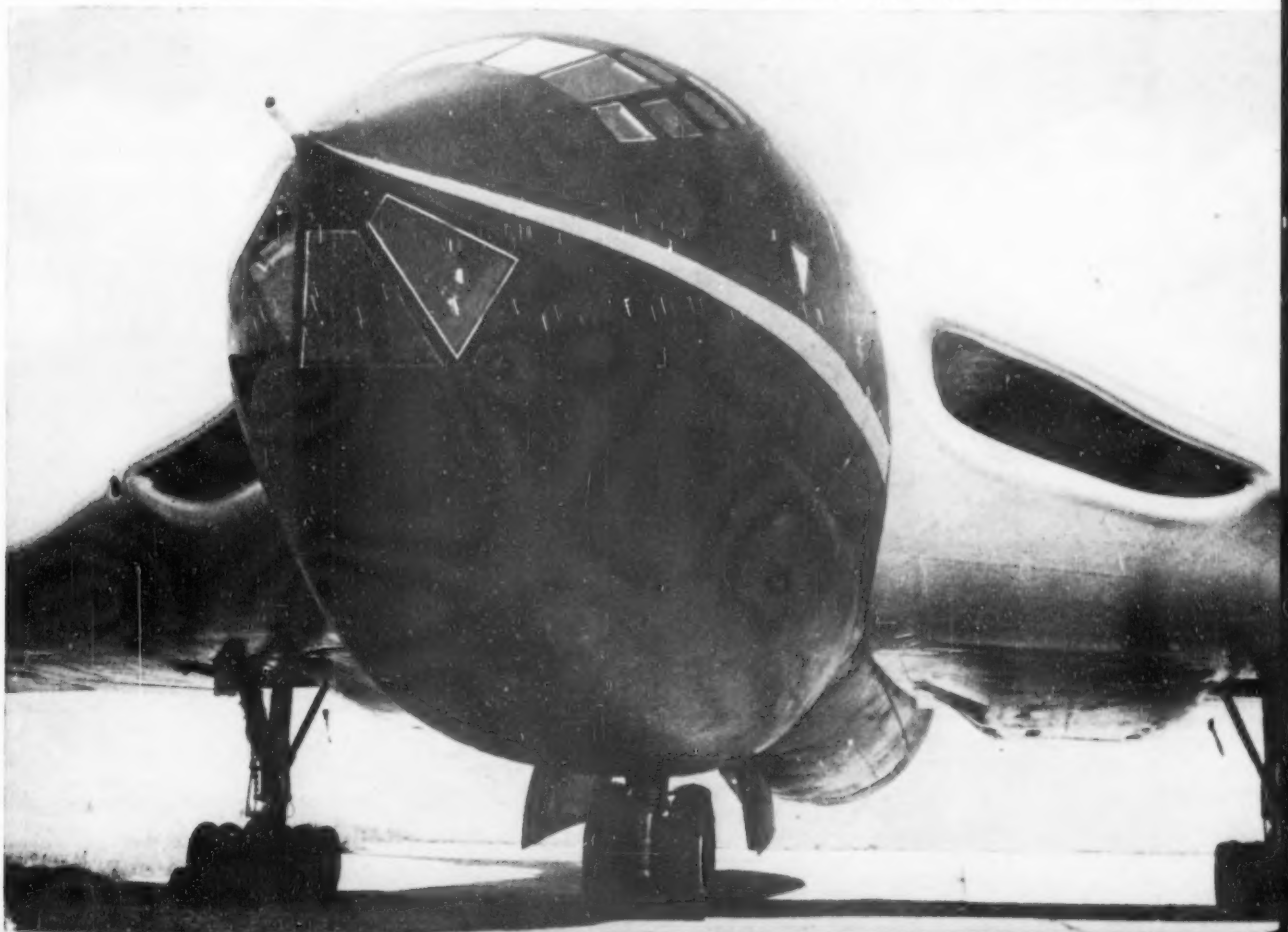
NEW MOONEY FOUR-PLACER, priced at $12,500, is ready for final certification and production following enlargement of cabin and added power. Cruise speed: 175 mph.

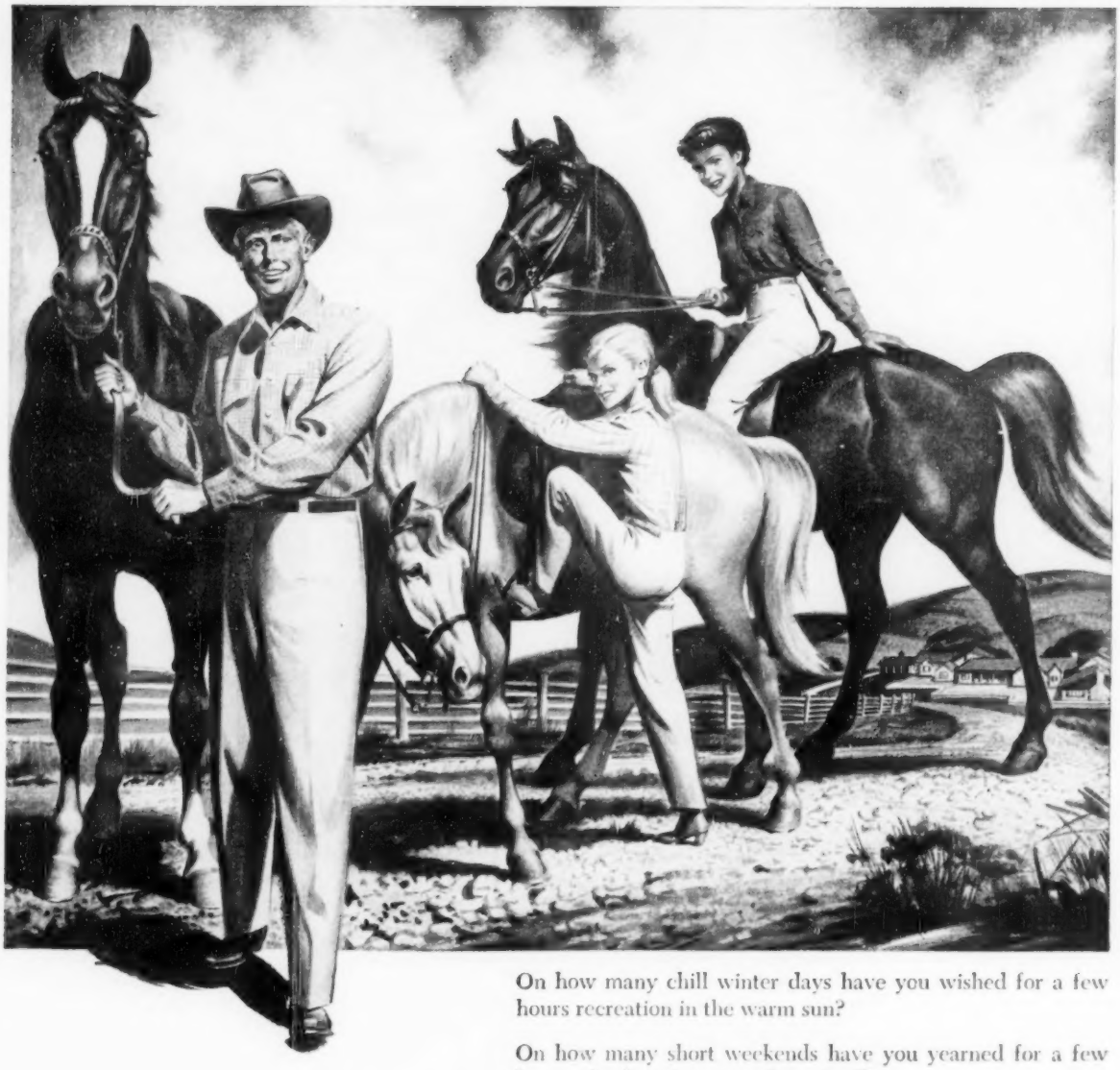
SIDEARM PROBE for aerial refueling skirts McDonnell F2H-3 Banshee's large nose radome.



WINNER of "non-production" light helicopter competition in France is Swiss craft by Robert Stirlin, Meyrin, Geneva. Rotor diameter of 65-hp. craft is 21.6 ft.

HANDLEY PAGE VICTOR closeup presents an unusual view. Its four Armstrong Siddeley Sapphire jets are buried in wingroots.





The warm sun is only hours away

On how many chill winter days have you wished for a few hours recreation in the warm sun?

On how many short weekends have you yearned for a few hours of relaxation away from it all?

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WHO'S WHERE

In the Front Office

Lt. Gen. Harold L. George (USAF Ret.) former vice president and general manager of Hughes Aircraft Co., has been elected senior vice president of Ramo-Wooldridge Corp., Los Angeles.

L. C. Burwell, Jr., vice president of Flying Tiger Line, has taken charge of the air-freight carrier's Eastern Division in a realignment of personnel. **George Messenger** is director of the new Contract Division. Other new department chiefs: **J. P. Goldsmith**, flight; **O. R. Burghardt**, assistant secretary-treasurer; **W. J. Duehren**, maintenance; **Paul Grace**, chief inspector; **Larry Ignasiak**, purchasing agent; **Arthur Klein**, material control; **Park Moewe**, legal and insurance; **Ralph Stump**, accounting; **Arthur Meyer**, personnel; **Len Kimball**, advertising and publicity, and **Charles Steeves**, engineering.

A. P. Fontaine, onetime vice president and general manager of Convair (1951-52), has become engineering director of Bendix Aviation Corp., Detroit; **Dr. A. C. Hall** has moved up to general manager of the company's research laboratories.

Changes

Fred N. Dickerman has been promoted by Chance Vought Aircraft, Inc., Dallas, to director of engineering. **Raymond C. Blaylock** has moved up to chief engineer.

Scholer Bangs, formerly with the Hearst newspaper chain, has become U.S. general manager and director for the Swiss aviation publication Interavia with headquarters at Monterey Park, Calif.

Edward J. Scott is operational manager of Greer Hydraulics' new Canadian subsidiary, Greer Hydraulics of Canada, Ltd., Montreal.

H. W. Cooper has taken charge of Superior Tube Co.'s new Mechanical Development Division, Norristown, Pa.

Col. William M. Talbot (USAF Ret.) has joined Cook Electric Co. as manager of the avionics manufacturer's Washington, D. C., office.

King D. Bird has taken charge of the new operations branch of Cornell Aeronautical Laboratory's 12-ft. variable density wind-tunnel, Buffalo, N. Y.

George R. Dutton has been appointed manager of manufacturing control materials for L. B. Smith Aircraft Corp., Miami, Fla.

Honors and Elections

Guy M. Miller, owner of Miller Aviation Center at Pittsburgh, has been elected president of the National Air Taxi Conference. New vice presidents: **Edward D. Morris**, manager of Piedmont Aviation, Inc., Norfolk, Va.; **Frank W. Mayock**, Wings Charter Service, Philadelphia.

Capt. Edward G. Sperry of USAF's Air Research and Development Command has received the Chaney Award for 1953 for his "outstanding performance in human tests" of the new downward ejection seat for the Boeing B-47 (AVIATION WEEK Nov. 22, p. 7).

INDUSTRY OBSERVER

► Bristol Aeroplane Co. will deliver a complete Britannia airframe to Royal Aircraft Establishment at Farnborough, England, in January for submerged tank tests similar to those performed on the de Havilland Comet. RAE will simulate 1,000 complete flights per week, corresponding to about 3,000 hr. of flight time. Estimated minimum safe fatigue life for the Britannia is 30,000 hr.

► **Boeing Airplane Co.'s four-jet 707 transport logged 26½ hr. in 18 flights during the first nine days it was back in service following an accident to its landing gear Sept. 20. This is a utilization of nearly 3 hr. a day.**

► The Red Bird, a highspeed, sweptwing tow target in production for the Air Force and Navy at East Coast Aeronautics, Pelham, N. Y., is creating interest in other U.S. services and foreign air arms. The simple structure incorporates aluminum and magnesium alloys, an electronic fire error indicator for recording near misses and automatic drogue chute to slow landings.

► **Convair has received a $1,320,000 USAF contract for "modification, modernization and decontamination" of RB-36 aircraft. Neither Convair nor Air Force will say which atomic blast made the planes "hot."**

► Curtiss-Wright Corp.'s Wright Aeronautical Division, looking ahead to testing of turbojet, ramjet and rocket engines of the future, may take over a valley in Nevada where noise will not be the problem that it is in populated areas.

► **YL-24 Courier, Army version of the Helioplane, still is undergoing evaluation tests at Camp Rucker, Ala. Final report should be ready early next year. Program has been delayed because of a lack of spare parts.**

► National Opinion Research Center at the University of Chicago will provide data soon to USAF on public opinion about noise from bases where jets operate. Data will be used by a committee working on longrange plans, headed by Maj. Gen. H. B. Thatcher, assistant deputy chief of staff for development.

► **All Navy carriers operating with the fleet now are equipped with nonflammable hydrolube (water-based hydraulic fluid) in their hydraulic catapults. The program was started before the tragic explosions aboard the USS Bennington and USS Leyte but was put on crash basis after those blasts.**

► Production of non-carrier aircraft—industrial, business and agricultural planes—will be about 845 in the last quarter of 1954, 4,370 in 1955, 4,498 during 1956 and 1,213 in the first quarter of 1957, Air Coordinating Committee reports.

► **Financing of 36 transport aircraft and related spares amounting to $76 million has been encouraged by accelerated tax writeoff benefits. Office of Defense Mobilization authorized certificates covering 80% of investment.**

► Civil Aeronautics Administration has developed a rotor-tip lighting system for helicopters to distinguish them from fixed-wing planes at night. The device weighs less than a pound, requires less than 300 watts of power and is visible against a background of city lights from a distance of 6.5 mi.

► **As part of its noise control program, USAF is trying to find a way to turn on a jet afterburner without an explosive start. Some aircraft neighbors confuse the sound with the sonic boom.**

► Deliveries of guided missiles increased 104% in fiscal 1954. Aircraft increased 5%, electronics and communication equipment 6%. Military delivery of tanks and automotive equipment fell 23%.

► **Commerce Department procurement synopsis discloses that North American Aviation will deliver F-100C and F-100D, fighter-bomber versions of the Super Sabre. Plane designations, not previously announced, are given for small contract covering spares and tools.**

Washington Roundup

Harmon Winners

Jacqueline Cochran Odlum, honored with the Harmon Trophy as the first woman to fly faster than sound, is not ready to slow down. "I lost most of my night's sleep," she told a Washington luncheon audience, "because a very distinguished man yesterday said it might be arranged for me to fly a Mach 2 airplane."

It was made clear earlier that the expenses of her F-86 record, made last year at Edwards AFB, were paid by Canadair, Ltd., manufacturers of the Orenda-powered fighter. Idea for the flight, according to William R. Enyart, former president of the Federation Aeronautique Internationale, originated with Col. Fred Asconi. Gen. Hoyt Vandenberg, the late USAF Chief of Staff, authorized use of Edwards facilities.

Miss Cochran shared Harmon honors at the luncheon, sponsored by Bell Aircraft Corp., with Maj. Charles E. (Chuck) Yeager, who last year flew the X-1A 1,650 mph.

Army Sensitivity

The Army is replacing its cannon with missiles, but not without showing marked sensitivity to criticism of its big rifles. Maj. Gen. James M. Gavin, assistant chief of staff for operations, said last week the Honest John artillery rocket is being made smaller and more potent. The new potency will come from an atomic warhead.

The general followed this with an expression of regret that the 280-mm. atomic cannon was not developed in time for use in Korea, where the army "certainly could have used it." His statement followed closely remarks by Democratic Sen. Clinton Anderson, who called the cannon an absurd weapon. Anderson probably will be chairman of the Joint Congressional Committee on Atomic Energy when the new Congress organizes.

Sen. Anderson inserted in the record an article pointing out that the 280-mm. cannon is vulnerable to enemy fire, clumsy and hard to move. Gen. Gavin countered with a statement that the cannon can support troops around the clock regardless of weather and that it would have been "grossly inexcusable" not to develop it.

The Army, now equipped with about 50 of the big rifles that cost about $1 million each, has stopped making them. Gen. Gavin said newer weapons, like Honest John and Corporal guided missile, must have higher priority.

By Republican Invitation

Senate Democrats were invited by Republican Leader William Knowland to revive their opposition to the Administration's cutback in land forces—and six air wings for their transport—without waiting for the convening of the new session in January. Knowland's apprehension, expressed in a major Senate address: that the Administration will follow a program of "coexistence and atomic stalemate (which) will result in ultimate communist victory."

Some concurring Democratic opinions:

Sen. Paul Douglas: ". . . If we reach a state of atomic stalemate, in which each side has available terrible weapons but each side is also afraid to use them lest they precipitate an atomic war, the whole world is exposed to the danger of being involved by the piecemeal extension of Communism to outlying areas of the world, but which rapidly eat into the very center . . .

"We should not endanger the strength of our ground forces because it is the great merit of these forces that they can deal with local circumstances, restrain aggression and yet minimize the danger of the expansion of a local struggle into a worldwide conflict . . .

"It seems to me it was a great mistake for us to have reduced the armed strength of our ground forces from 20 to 17 divisions. . . ."

Sen. Stuart Symington: "I am worried about the strength of the Army . . .

"Before we approve recommendations from the military this time, should we not give full consideration to what negotiating from relative weakness as against relative strength means to the future security of the country?"

Mail Issue in Court

The railroads have gone to court in the battle to choke off the growing diversion of first-class surface mail to air transportation. The move was predicted in AVIATION WEEK (Oct. 4, p. 79). Five western railroads—the Santa Fe, Union Pacific, Southern Pacific, Great Northern and Northern Pacific—have filed a complaint in the Federal District Court in Washington, D. C., against Postmaster General Arthur E. Summerfield, claiming he goes beyond his statutory authority in instituting and operating the surface-mail-by-air program.

The five railroads are asking for a restraining order to halt the new West Coast phase of the program that started last week. Rail carriers involved in the suit are those directly affected by the West Coast experiment, but the move is viewed as an attack on the whole program and is a key issue in the rail argument—whether such service is legal under present law.

In their complaint, the railroads maintain that ". . . statutory provisions . . . prohibit the Postmaster General from arranging for the transportation of mail by air unless the postage prescribed by law has been paid. No other statute authorizes the Postmaster General to institute or provide for this authorized service. The proposed service . . . can neither be validly instituted nor continued."

Patent Criticism

Aircraft industry is not alone in its dissatisfaction with progress toward revision of armed services procurement regulation section dealing with patents and copyrights. Joint Congressional Committee on Defense Production has issued a report, saying: "Regardless of periodic followup on the part of its staff, another year has now elapsed and industry has received little relief with respect to this problem."

The committee says responsibility has been shifted to three or four different persons or groups and that conflicts of interest "have developed between the military departments and the Department of Defense."

In addition, it is known there is some disagreement within the industry and a timidity on the part of spokesmen, who would like to express strong opinions but are held in check by the customer relations problem. Industry still hopes to reach a settlement with the armed forces on patents and copyrights by the year-end.

On the subject of technical data, further controversy is expected—particularly with the Army. Major complaint is that military men sometimes demand full technical details and manufacturing knowhow for a product, arguing that they need it for maintenance purposes. Later it is circulated to competitors with invitations to bid, or an arsenal starts to make the item.

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Commercial Operators claim:

Copters Must Be Tailored to Heliports

- **Space available in cities is design key, IATA says.**
- **This is in basic conflict with viewpoint of AIA.**

By Claude Witze

Basic disagreement between helicopter manufacturers and commercial operators over heliport planning has broken into the open.

The problem centers on a fundamental debate: Which comes first, the helicopter or the heliport?

Will the helicopter industry design its commercial aircraft to fit existing landing areas, designed and located by ambitious municipalities? Or will heliports be designed to accommodate rotary-wing transports that have grown out of military specifications?

▶ **Heliports First**—First lines for the argument were drawn with an announcement by the International Air Transport Assn. that its international working group of copter operators has decided the size and location of heliports should be determined first.

The aircraft, they say, then must be designed to fit the landing areas.

This principle is fundamental, the IATA group says. They maintain that a realistic determination of the size and location of city landing areas must precede any attempt on their part to determine the shape of helicopter operations and the type of equipment they need.

The IATA position stands in sharp contrast to the stand taken recently by the heliport committee of the Helicopter Council of the Aircraft Industries Assn. (AVIATION WEEK Aug. 9, p. 51).

▶ **Industry Views**—The AIA report, now undergoing final revision, will be offered to the Helicopter Council as an official statement of the industry's stand at a meeting in Washington, D. C., Dec. 17. It is being rephrased in minor degree to meet some criticism from the Air Transport Assn.

Cities and towns, the AIA report advises, should not go ahead with plans to build heliports or freeze heliport designs until more is known about the size and operating characteristics of commercial rotary-wing aircraft.

And these characteristics, the industry anticipates, will not be frozen until they have a more complete picture of what the commercial operators need as an aircraft.

▶ **Tailored Specs**—Now the IATA group has agreed that before specifications can be set down, they must see the heliports.

Their viewpoint, resolved at a first meeting in Montreal, was given by the chairman, Anselme Vernieuwe, vice president of Sabena and operator of one of the major helicopter passenger services (AVIATION WEEK Oct. 4, p. 12; Oct. 11, p. 100).

"The future development of the helicopter," Vernieuwe said, "must very largely be conditioned by the fact that it will have to operate into the heart of the world's cities.

"While we all feel we shall want helicopters carrying about the same number of passengers as the average autobus, we must tailor their performance specifications to fit the landing space inside the cities we hope to serve."

▶ **Unknown Factors**—The viewpoint of the manufacturers on the other hand, as expressed in the AIA Helicopter Council committee report, is that there are too many unknown factors in regard to the performance of future transport helicopters to warrant investment in heliport construction at this time.

Until more information and equipment are available, the AIA group said last summer, it is impossible to draw up sound and complete recommendations as to where heliports should be located, what devices they must have or how big they should be.

The manufacturers emphasized, in fact, that until more operational experience is gained, "it appears that each location should be studied individually with an eye to both immediate requirements and future needs. . . ."

▶ **Brussels Meeting**—There was no indication last week of how the copter manufacturers and operators may resolve their differences. The working group headed by Vernieuwe grew out of an IATA symposium held 30 months ago in Puerto Rico.

At that meeting there were representatives of the manufacturers, the designers and the potential users of commercial transport helicopters. Second meeting of the working group of operators will be held in Brussels next February. At that time, Vernieuwe says,

Ryan Endorses New Copter Tests

Advanced helicopters of the military services should be turned over to commercial operators "to be tested and realistically appraised under the exacting conditions of scheduled commercial operations," Civil Aeronautics Board member Oswald Ryan believes.

A similar proposal was made last May by New York Airways at the Army's Helicopter Symposium in St. Louis (Aviation Week May 17, p. 14).

The New York helicopter airline suggested that the military operate a commercial service to get accelerated test experience.

This idea is not favored by the armed forces, who would prefer to turn the aircraft over to airline operators and not compete with them.

Ryan, in a speech marking the inauguration of helicopter passenger service by Los Angeles Airways, said: "The pressing need of the present hour . . . is for a program which will hasten the approach of the helicopter to commercial maturity and the fulfillment of its undoubted potential as an essential part of our air transportation system."

The CAB member observed that an arrangement for commercial operation of military helicopters "would not be different in principle from the arrangement which was entered into early in World War II between the Air Transport Command of the Army and certain airlines for the service testing of early (Lockheed) Constellation aircraft—an arrangement which produced successful and valuable benefits to both military and civil aviation."

This proposal for "closer cooperation in the design stage and for in-service testing," Ryan said, is the only one "on the immediate horizon for accelerating the development of a more economic helicopter."

there will be a report from a special commission set up to explore the practical limits of landing spaces on the ground and on rooftops.

The IATA chairman contends that the helicopter operators' approach to the heliport problem has no parallel in the development of fixed-wing planes.

▶ **IATA Qualifications**—"With the fixed-wing aircraft," he says, "we could almost always design the airplane and then find enough landing area for it somewhere out in the country.

"But now that the helicopter has moved air transport downtown, we must design the vehicle to fit the accommodation actually available to it well inside builtup areas."

Vernieuwe claims his IATA organization is "the most qualified group in the world in this new branch of activity." It includes men from scheduled airlines and commercial operators as well as other groups now using helicopters for transport.

Because his group represents the widest experience with commercial helicopter operation, Vernieuwe indicates, it does not intend to sit by while municipalities and helicopter makers make vital decisions.

▶ **Problems**—He says IATA now has parallel groups of European and North American operators working on the problems of heliport size and location and the resulting performance requirements. These groups will:

- **Study site problems**, such as proximity to traffic and city services, obstructions, noise, air traffic control, approach aids, weather, wind direction and turbulence.
- **Draw up recommendations** on dimensions and layout of heliports, takeoff and landing areas, loading, servicing, maintenance and parking.
- **Consider the questions** of visual aids, refueling, ground operation safety, ownership and operation of heliports.

Vernieuwe anticipates that the Brussels meeting will produce some guidance for helicopter manufacturers. If possible, the recommendations will be boiled down to certain types and sizes that can cover all types of commercial operations.

▶ **Principles**—The chairman says the companies represented, which now carry hundreds of thousands of passengers each year and operate all over the world, agreed to four other principles in addition to their stand on heliports:

- Helicopter problems are of interest to all airlines, whether they will fly them or not. Helicopters and airplanes will share the same air space in terminals.
- The helicopter must be given a full chance to develop on the basis of what it can do.
- It must not be fettered by the limitations put on fixed-wing airplanes.
- Regulation of helicopters must not be fixed until we have more experience in their operation. Rotary-wings make their own rules, day by day.

Comments the IATA working group: "We now have—probably for the first time in commercial aviation history—the opportunity to set up a completely new policy and do away with the old administrative complications which, in fixed-wing operations, have too often been considered before the operational necessities for them developed."

▶ **Montreal Highlights**—Other highlights of the IATA helicopter meeting:

- A commission was set up to draft operational requirements for air traffic control, navigation and communication requirements.
- The IATA Technical Secretariat has started to collect data on what the commercial operators believe should be the economic characteristics and sizes of transport helicopters.
- Helicopter manufacturers will be urged to pay special attention to noise suppression.
- The operators believe simplicity must be the keynote of helicopter design. In this, they have wide support from the military services.
- A list will be drafted of the kind of technical data operators require of manufacturers.
- Because vibration cuts the life of instruments and radio equipment in helicopters, the group says improved shock mountings must be provided.

U.S. operators represented at the Montreal meeting included Cleveland Air Taxi, Helicopter Air Service (Chicago), Mohawk Airlines, New York Airways, Port of New York Authority, Petroleum Bell (New Orleans). Donald Talmadge represented the helicopter committee of ATA.

New Supersonic-Class McDonnell F-101A Carries A-Weapons

First view of the Strategic Air Command's new longrange McDonnell F-101A Voodoo supersonic-class fighter that is capable of carrying atomic weapons and can be refueled in midair. Developed from the XF-88A, first flown in 1948, the more powerful F-101A has two P&WA J57 twin-spool turbojets totaling approximately 20,000 lb. thrust. Wings and stabilizer are swept 35 deg. Dimensions: span 39.7 ft., length 67.4 ft., height 18 ft. It employs a parachute brake and has retractable speed brakes in the aft fuselage. Wing skin consists of heavy, tapered, preformed sections. The new fighter has provisions for carrying auxiliary fuel externally. Earlier F-101As have been undergoing flight evaluation at Edwards AFB, Calif. The photo-reconnaissance version is the RF-101A.

Comet Crash Court Stresses 'No Blame'

(McGraw-Hill World News)

London—The last act of the Comet tragedy is playing toward an anti-climax in which all the counsels are proving that nobody is really to blame and are giving recommendations for precluding any such future recurrence.

Sir Hartley Shawcross, representing Comet builder de Havilland Aircraft Co., spent hours emphasizing that manufacturing cracks had nothing to do with the two crashes and assuring the court that extreme steps would be taken in the future to minimize chances of their occurring.

Meantime, de Havilland, keeping its fingers crossed on orders for 34 Comet 2s, is modifying that airplane with a target date of 18 months for first deliveries. Modification will consist of some redesign, some beefing up of structure and thicker skins. The hope is that this will not affect the minimum break-even load factor of less than 50% originally quoted to customers.

DH is counting on two factors:

- **Comet 2** has an unanticipated power bonus in a revised rating of the Rolls-Royce Avon engines that will offset the increased weight somewhat.
- **Empty weight** of the production airplane is less than originally calculated.

De Havilland's future promotion on the Comet undoubtedly will stress the fact that the jet transports are the most thoroughly tested airliners in the world and therefore the safest.

Piper Business Plane Backlog: $6 Million

Increasing business use of aircraft is largely responsible for the largest civil plane backlog ever held by Piper Aircraft Corp., sales manager J. W. Miller told a meeting of the company's distributors at Lock Haven, Pa., recently.

Piper is ending this year with more than $6 million in firm orders for its twin-engine Apache, the new 150-hp. Tri-Pacer, Super Cub and PA-18-A agricultural planes.

▶ **Business Trend**—A Piper survey shows non-business users of the company's four-place Tri-Pacer have dropped to 3%, Miller said. The 97% who flew their planes for business purposes said they average 320 hr., or nearly 40,000 mi. annually.

Another noteworthy trend highlighted by the survey showed the continuing rise in use of omnirange equipment, compared with ADF radio equipment in Tri-Pacers.

Compared with 1951, when 17% of Tri-Pacer owners had omni equipment and 8.5% had ADF, the respective figures for 1954 are 85% and 8.5%.

Instrument panels also have shown the trend toward increased utility: In 1951, 46% of the planes had standard panels, 46% had primary equipment and only 8% advanced panels. This year's survey shows 14% have standard panels, 12% have primary instruments and 74% have advanced equipment.

▶ **Owner Breakdown**—Detailing the purchasers of Piper business planes, Miller gave these figures (1953 figures in parenthesis): farmers and ranchers, 18.2% (22.5%); manufacturers, 27.5% (22.5%); construction firms, 12.2% (14.5%); physicians, 9.2% (13.4%); wholesalers-distributors, 15.8% (10.8%); engineers and architects, 6.2% (6.2%), and miscellaneous 10.9% (10.1%).

Of those buying Piper airplanes this year, 23% never before had owned a Piper, 22% never had owned an airplane and 55% were previous Piper owners.

At the close of the three-day sales sessions, attended by 200 distributors and others, a total of 76 Tri-Pacers and Apaches left the plant for delivery.

CAA Reports Civil Flying Gains, Losses

Gains in business, agricultural and pleasure flying are reported in a sample survey by Civil Aeronautics Administration.

CAA reports the following increases in flying activity in 1953 over 1952: business flying, 16%; patrol, survey and other industrial flying, 11%; commercial agricultural flying, 2%; pleasure flying, 13%.

Declines in 1953, as compared with 1952, are reported in these categories: instructional flying, 17%; passenger and cargo transportation for hire—including irregular airline operations but not military contract flying or scheduled airline activity, 18%; test, ferry, demonstration and Civil Air Patrol flying, 22%.

Business flying totaled 3,626,000 hr., 430,000 hr. more than the revenue hours flown by all the scheduled airlines—both domestic and international.

New USAF Computer

The first electronic data processing machine to be installed at an Air Force field installation will be delivered next March to Mallory Air Force Depot at Memphis, Air Materiel Command reports.

A part of USAF's program to simplify and streamline AMC supply procedures, the new machine—called Elecom 125—will be leased for about $10,000 a month. The Air Force already has a Remington Rand Univac installed at AMC headquarters.

Bell Shows New 47J

AIR-RESCUE capability is demonstrated by new Bell 47J. Its Navy-type hoist can lift two men simultaneously if necessary.

INTERNAL HOIST lifts man into cabin at rate of 90 fpm. Pilot can operate copter and hoist controls from a single console.

AUXILIARY FUEL CELL is 52-gal. U. S. rubber bag, part of kit that includes wobble pump and quick-disconnect lines.

Navy Cancels F3H-2s, A2U-1s

U. S. Navy has canceled orders for more than 200 McDonnell F3H-2 Demon fighters and 96 Chance-Vought A2U-1 attack planes largely because of delays in engine development programs, confirming a report in Aviation Week (Oct. 25, p. 11).

Total value of the canceled contracts is $372 million, broken down as follows:

- Chance-Vought Aircraft, Inc., Dallas, for A2U-1 airframes, $75 million. The plane is an attack version of the F7U-3 Cutlass fighter.
- Westinghouse Electric Corp., Kansas City, for J46-WE-18 engines used in the Chance-Vought plane, $75 million.
- McDonnell Aircraft Corp., St. Louis, for F3H-2 airframes, $135 million.
- Allison Division of General Motors Inc., Indianapolis, for J71-A-2 engines used in the Demon, $36 million.
- Armament, radar equipment and other components, $51 million. Manufacturers were not listed.

Bureau of Aeronautics indicates the money realized by the cancelation will be used for more modern planes, pointing out that delays in development of the two engines as well as the A2U-1 airframe would make the 296 canceled planes obsolete by delivery time.

Navy already has purchased additional numbers of Grumman F9F-8 Cougar fighters, powered by Pratt & Whitney Aircraft J48 engines.

Allison's J71 engine is being delivered to the Air Force for installation in the Douglas B-66 light bomber, but the version intended for the McDonnell Demon only recently started in production. One engine has been delivered and is undergoing tests. Allison was called into the Demon supply picture late, to provide a power unit to replace the Westinghouse J40 used in earlier versions.

Allison said more than 200 engines were involved in the cutback.

McDonnell pointed out that the company still has a substantial number of Demons on order and said there would be no layoff of personnel.

The company last week unveiled the F-101A Voodoo (see p. 14), new long-range fighter for use by the Air Force in the Strategic Air Command. The company said it has a contract for more than $100 million for the new supersonic plane, which made its first flight at Edwards AFB last fall.

NATA Asks Youth Air School Program

Youth training in technical aviation skills—instead of a Universal Military Training program—is urged by John Griffin, vice president of National Aviation Trades Assn.

He called for a "widespread indoctrination of our youth in piloting and as aviation mechanics, electronic technicians, instrument technicians and weapons technicians" in an address to NATA's annual convention at Miami Beach, Fla.

▶ **CAA, USAF 'Failings'**—The establishment of a youth training program in the Union of South Africa, Griffin said, leaves the U. S. "as probably the only nation represented in the United Nations which still has no active program for the air indoctrination of its youth."

He criticized Civil Aeronautics Administration and the Air Force for requiring a course in jet engines in all approved technician schools and then failing to make engines available. "USAF has made certain that it will not be possible for an American civilian to receive practical instruction on jet engines," he commented.

Defense Department spokesmen disclosed that $500 million will be spent in contract maintenance over the coming year.

The Air Force, it was said, plans to contract for maintenance on engines below 2,800 cu. in., trainer aircraft without tactical counterparts and cargo aircraft—where possible.

▶ **Businessmen Students**—Other convention highlights:

- **Kenneth Aldrich,** chief of CAA's General Operations Branch, noted an increase in student pilots this year, remarking: "The new students are usually businessmen or persons who are taking up flying for a specific reason. They are learning to fly to enable them to use their own aircraft for a specific usage."

He blamed "incomplete instruction," emphasizing "getting past a CAA test" and lacking in specialized instruction, for private plane accidents.

In an effort to overcome this failing, he said, CAA is keeping records on its instructors and examiners of accidents to their students within one year after receiving pilot certificates. When an instructor is posted with five such accidents involving students graduated less than a year, CAA field agents make a check.

- **Lt. Col. Walter Thompson,** deputy chief of staff-cadets for the Civil Air Patrol, observed that "for the first time in the 50-yr. history of the airplane, the supply of young men who are interested in flying is dangerously low. What makes the problem even more critical is the fact that this supply seems to be continuing to dwindle."
- **Glenn Degner,** manager of the Owatonna (Minn.) Municipal Airport, said private capital is anxious to obtain space at publicly owned airports if adequate security and tenure of site can be obtained.

Airlines to Get Bigger Share of Military Mail

Defense Department plans to increase substantially the volume of military mail for shipment by commercial air carriers, but only the lines specifically certificated by Civil Aeronautics Board to carry "mail" will be eligible to participate in the new business. The developments:

- **Defense Department** confirmed that its program contemplates a "substantial" shift in military airmail, now being transported by Military Air Transport Service, to commercial carriers. The division between MATS and commercial lines is now approximately 50-50.
- **A CAB decision,** declaring that "mail" cannot be classed as "property," bans Seaboard & Western Airlines and Transocean Air Lines from transporting bulk overseas military mail shipments. The two carriers had applied to transport the mail as cargo, at cargo rates.

Post Office Department opposed the Board's decision.

Although Defense Department will pay for the shipment of military mail, Post Office consistently has favored bulk mail shipments at cargo rates. Four members of the Board concurred in its decision. The fifth member, Joseph Adams, did not participate.

There is apprehension in some military circles that cutting back MATS mail activity may lead to a weakening of the service.

F-86s Show Fatigue

Rugged training program at Nellis AFB, Nev., has caused some F-86 fighters at that installation to show signs of fatigue and resulted in the recent grounding order, according to North American Aviation, manufacturer of the plane.

The grounding order has been lifted, the company says, but all F-86A, F-86E, F-86F and F-86D aircraft are being inspected for signs of fatigue in underwing aluminum attach bars. Faulty bars will be bolstered with a steel plate.

North American points out there is no other record of fatigue failure in the F-86's history, including the Korean war. Planes were grounded earlier this month, by the Nellis AFB commander for 11 days following two accidents at that base (Aviation Week Nov. 15, p. 7).

Westinghouse to Spend $1 Million on Computer

Development of a compact, lightweight, airborne digital computer for automatic control of aircraft and guided missiles will be undertaken by Westinghouse Electric Corp. and Ramo-Wooldridge Corp.

The $1-million program is being financed by Westinghouse without federal assistance. Use of the equipment in specific military aircraft is expected within two years.

► **Digital Advancement**—F. W. Godsey, manager of Westinghouse's Baltimore divisions, and Dean E. Wooldridge, president of Ramo-Wooldridge, said in a joint statement:

"It is not commonly appreciated that recent advances in digital computing have been so rapid that it now appears practicable to design into lightweight airborne equipment much of the same highspeed, highly accurate computing and data-handling capability that characterizes the electronic equipment now being applied to scientific, business and industrial tasks.

"This means taking today's bulky computers off the ground where they have been confined until now and converting them into . . . packages for aircraft, where they will automatically control simultaneous functions such as flight, navigation, engine and fire control in the higher-speed aircraft and guided missiles of the future."

► **R-W Experience Edge**—Godsey said the digital computer can do a variety of problems in rapid sequence without duplicating sections of the computer for individual problems. "The analog computer would require several sections adding weight and taking up space," he said.

Contract was made with Ramo-Wooldridge, Godsey said, because their engineers have developed experience with these computers. "It will save us several years of effort," he said.

Transistorized B-25

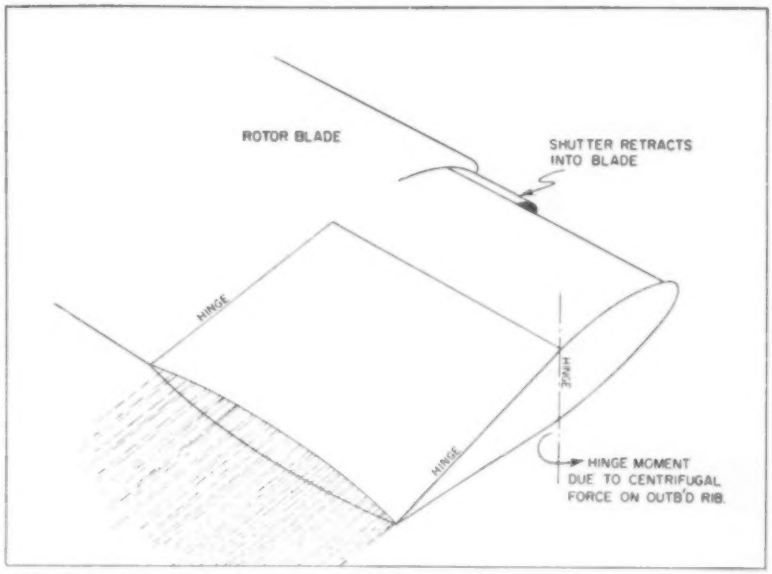
Bendix Aviation Corp. reported last week it has flown a B-25 converted bomber with an automatic pilot using transistors instead of electron tubes. The flight took place at Teterboro, N. J., last May and further tests are now being held.

A second autopilot system using transistors has been sent to Wright Air Development Center for evaluation on the ground in a Lockheed F-94C, said R. P. Lansing, Bendix Aviation vice president.

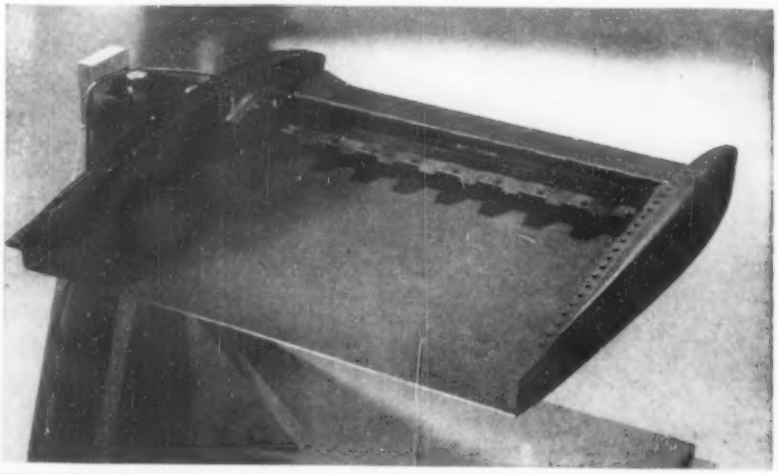
Lansing said the new device requires less power, takes up less space and is more durable than an autopilot using tubes.

TYPICAL INSTALLATION proposed for retractable Marquardt ramjet engine is shown in artist's conception on a Sikorsky HRS-type copter. Engine produces about 40 lb. thrust.

Marquardt Tests Ramjet for Copters



SHUTTER in leading edge of rotor tip retracts into blade, providing air inlet to ramjet engine. Three of these units would double payload of 6,400-lb. copter, Marquardt says.



TOP SKIN REMOVED, working test model shows flameholder (toothed channel). Unit also contains fuel nozzles and firing plug. Ramjet measures 16.5 in. by 2.5 in. by 15 in.

USAF Develops New Jet Muffler

Inexpensive, portable noise suppressor to go on runup lines at air bases, will not be used in flight operations.

Air Force plans to have an improved noise suppressor for turbojet engines within 10 months.

USAF says the purpose of the new device is limited. It will be a muffler, practical for the average air base line where jet engines are run up after routine maintenance.

The noise suppressor will not be used in test cell operations or carried on aircraft to cut the roar of engines as the plane leaves the runway.

▶ **Inexpensive, Portable**—The new muffler will be relatively inexpensive and portable, easy to use and as effective as some of the more elaborate installations that cost from $25,000 to $60,000.

This is not the first effort. Wright Air Development Center considered the problem and came up last September with a semi-portable noise suppressor that was obsolete by the time the design was complete.

Details on this design are not available, but it is understood the idea is being reworked and will be through final evaluation early in 1956.

Both the muffler and the semi-portable suppressor are devices that cut down noise levels during ground operations. In this sense, they are like the jet engine test cell and simple blast wall that do not reduce the noise but deflect its intensity from neighbors.

▶ **Major Problem**—Dr. A. W. Hetherington, who monitors noise suppression projects at headquarters of the Air Research and Development Command in Baltimore, says USAF's major problem today is on the line at bases where minor repairs and maintenance are done for day-to-day operations. The work here is removed from fixed overhaul depot installations. Mechanics cannot spend a day putting the aircraft in a fixed rig before the runup. Expensive equipment is out of the question.

These bases also are the ones, Hetherington says, where the Air Force has a substantial part of its community relations problem. There always will be physical limitations on how much of the noise can be eliminated, so an educational program is necessary to increase community tolerance to jets.

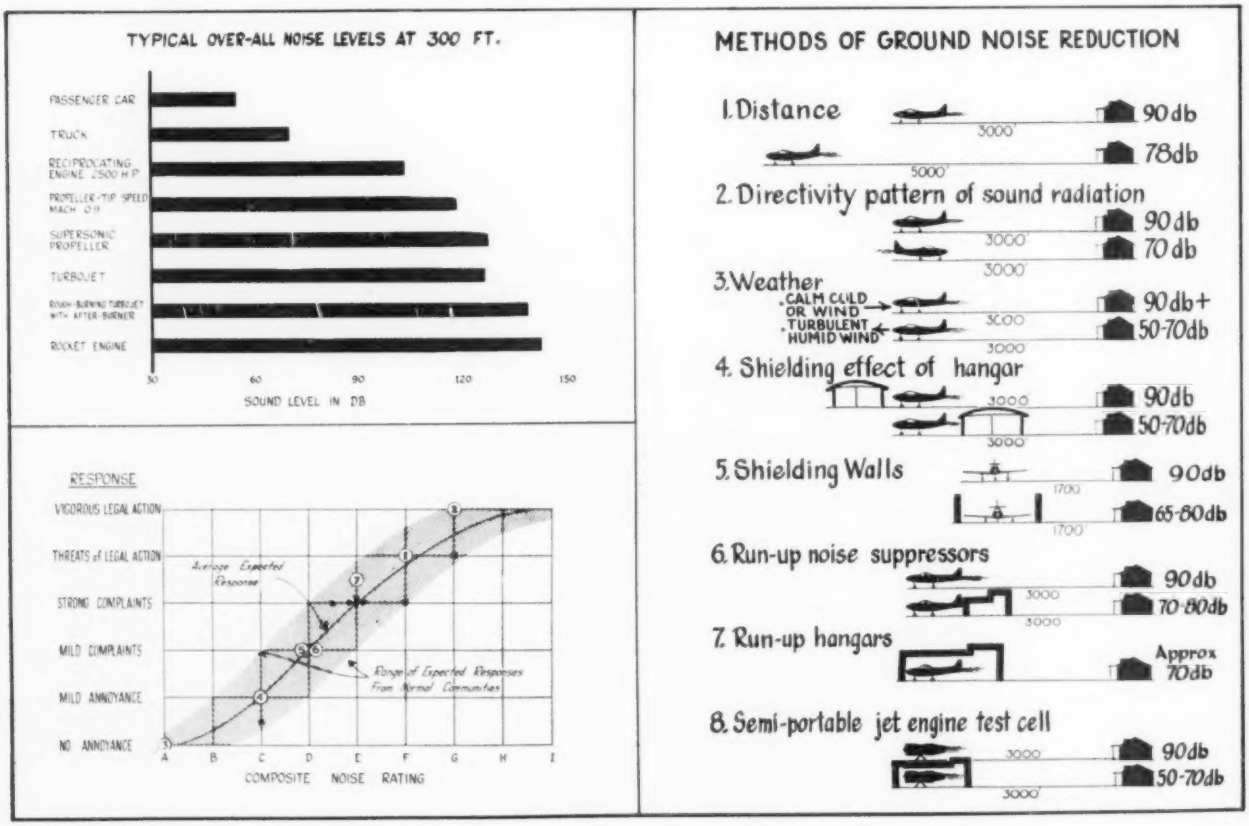
At permanent overhaul depots, where jet engines are operated without the supporting airframe, USAF feels that test cell development has reached a practical basis. Hetherington says their improvement now is down to a refinement of detail. Biggest concern in this field is need for cheaper materials and methods of construction.

▶ **Design Challenge**—In meeting the challenge for a semi-portable, inexpensive and easy-to-use noise suppressor for scattered air base operations, one of the recent major problems has been the fast progress made in developing higher-thrust power units. The noise increases in direct proportion to the thrust.

Hetherington says ARDC experts have been accused of "over-designing," only to have the muffling device prove insufficient when completed. The reason: Jet engines became noisier as they were being designed.

Whether portable or stationary, USAF figures a noise suppressor should be able to cut the din at least from 10 to 20 decibels (see chart). Because of the problems of size, weight, cost and increased engine maintenance time, increasing stress is being placed on the portable, small, movable muffler for each engine pod.

The new device, when complete, will be evaluated by WADC's powerplant laboratory and the Bio-acoustic section of the Aero Medical Laboratory.



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used by Northwest Orient Airlines for detecting wing flap unbalance

As an extra measure to assure safely balanced wing flap positioning, Northwest Orient Airlines equips its Stratocruisers with a specially engineered Barber-Colman unbalance shut-off system. Fully automatic and entirely independent of crew monitoring, this system utilizes a bridge circuit with two rheostats coupled to the outboard ends of the torque tube which actuates the flap jackscrews. Unequal actuation unbalances the circuit and a Barber-Colman Micropositioner, acting as the detecting element, is energized if flaps become unbalanced by 5 degrees. Power to the flap motor is then shut off and a warning light is turned on in the cockpit. The development of this system is another example of Barber-Colman Company's close co-operation with customers in solving specialized problems.

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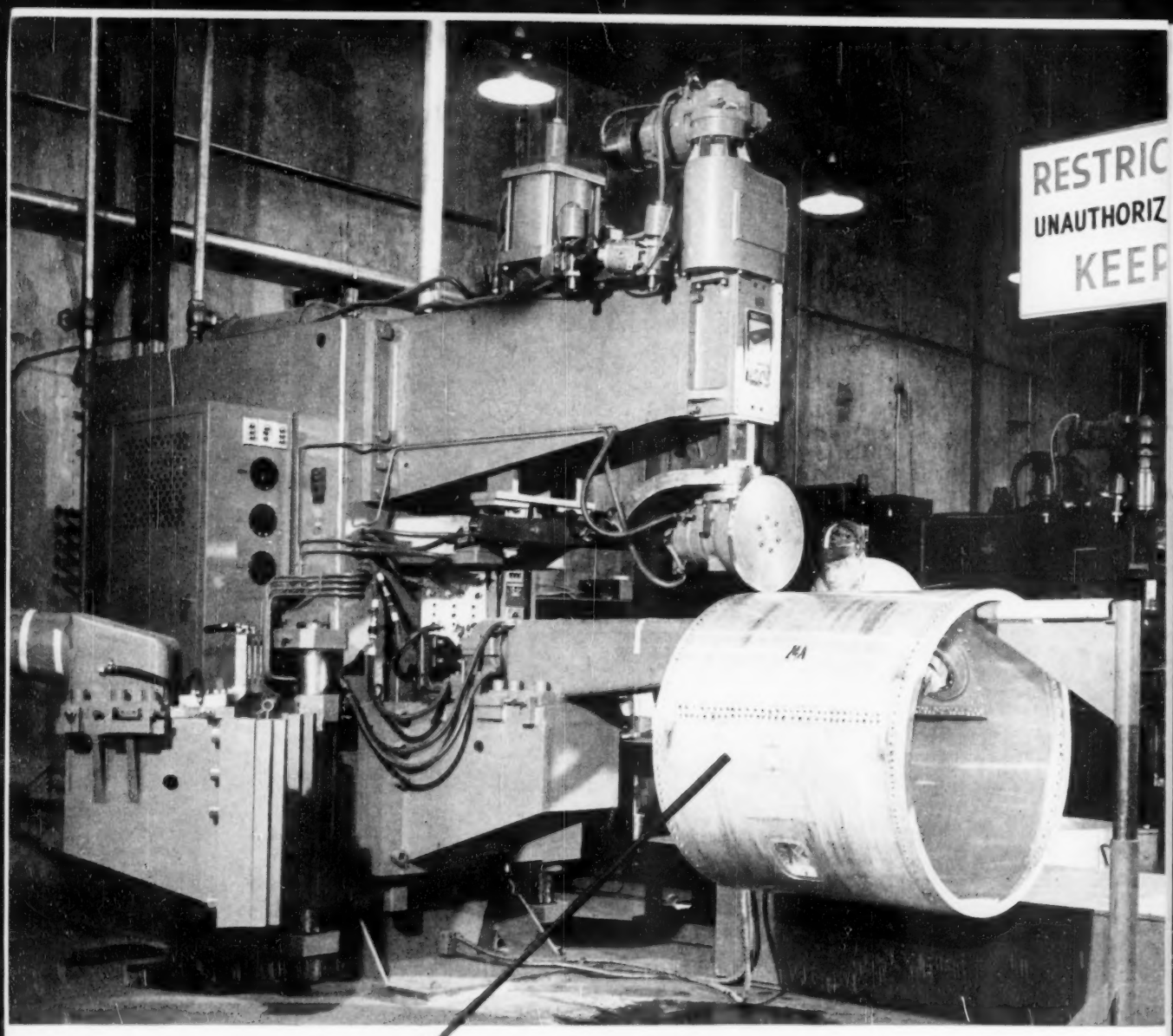

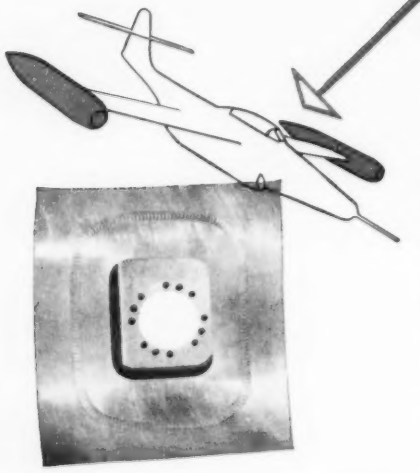

Northrop F-89-D Scorpion Fuel Pods Almost Entirely Resistance Welded

The Aircraft Division of Day & Night Mfg. Co., Monrovia, California, manufacturers of the fuel pod for the Northrop F-89-D Scorpion, take full advantage of all the possibilities of resistance welding. As much as 98% of the fastening in the fabrication of component parts of the fuel pod is done with Sciaky spot and seam welding.

Day & Night technique of fabrication reveals some interesting examples of simplicity and efficiency. The fuel port assembly for instance does not use the classic pairs of parallel seam welds which criss-cross at right angles. Instead a seam weld following the shape of the opening has been adopted. You can read the details of this and other interesting facts of Day & Night resistance welding by writing for "Resistance Welding at Work," Vol. 3 — No. 6.

Day & Night resistance welding of the Scorpion's fuel pods is another fine example of Sciaky basic thinking — welders designed to do *more useful work* at *lowest operating cost* with *maximum reliability.*

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SEC Reports Airlines, Aircraft Stock Sales

Acquisition of 10,000 common shares of General Dynamics Corp. stock by John Jay Hopkins, chairman and president, is reported in Securities & Exchange Commission's latest survey of aircraft transactions. This increases Hopkins' total holding to 11,166 shares.

Other transactions in stock of General Dynamics, parent firm of Convair, include: disposal of 1,014 common shares by J. Geoffrey Notman, officer and director, leaving a holding of 100; disposal of 700 common shares by O. P. Robinson, officer and director, leaving a holding of 3,124 shares; acquisition of 1,000 common shares by L. B. Richardson, officer, making a total holding of 2,615 shares.

For the mid-September to mid-October period, SEC also reports:

Air Associates. Disposal of 100 common shares by Hal A. Kroeger, director, leaving a holding of 650.

Alaska Airlines. Acquisition of 2,000 common shares and disposal of 2,600 shares by Paul C. Taylor, director, leaving a holding of 8,900; acquisition of $5,000, 12 yr., 5½% convertible bonds, by R. W. Marshall, director, his total holding.

Allegheny Airlines. Disposal of 5,300 common shares by Robert M. Love, director, leaving a holding of 22,700.

Aluminum Company of America. Disposal of 6,800 common shares by Arthur V. Davis, director, leaving a holding of 303,612; disposal of 100 common shares by Robert B. McKee, officer, leaving a holding of 400.

Aro Equipment Corp. Acquisition of 3,300 common shares by Alvar N. Abelson, officer and director, making a holding of 4,557; acquisition of 2,500 common shares by M. J. Anderson, director, making a holding of 4,158; acquisition of 3,200 common shares by Lemuel Hawk, officer and director, making a holding of 4,450; acquisition of 115 common shares by Charles V. Kinter, director, making a holding of 251; acquisition of 960 common shares by John C. Markey, officer and director, making a total holding of 109,430; acquisition of 100 common shares by Ralph E. McConnell, director, making a holding of 9,380; acquisition of 3,200 common shares by Ralph W. Morrison, officer and director, making a holding of 5,059.

Beech Aircraft Corp. Disposal of 1,100 common shares held in trusts, by Mrs. Olive Ann Beech, officer and director, leaving a direct holding of 64,222 shares and trusts of 46,070.

Bendix Aviation Corp. Acquisition of 200 common shares by Malcolm P. Ferguson, officer and director, making a holding of 1,463.

Capital Airlines. Acquisition of 200 common shares by William V. Couchman, director, his acquisition of 1,000 common shares by Thomas G. Neelands, director, making a holding of 6,000; acquisition of 1,200 shares through exercise of option by Raymond G. Lochiel, officer, making a total holding of 7,000.

Cessna Aircraft Corp. Disposal of 700 common shares by Getto McDonald, director, leaving a holding of 7,000.

Curtiss-Wright Corp. Disposal of 500 common shares by S. B. Kurzina, Jr., officer, his total holding.

Firestone Tire & Rubber Co. Disposal of 100 common shares by Harvey S. Firestone, Jr., officer and director, leaving a holding of 26,285; acquisition of 1,500 common shares by Claude A. Pauley, officer, making a holding of 2,600; disposal of 500 common shares by Harold M. Taylor, officer, leaving a holding of 650.

Flying Tiger Line. Disposal of 100 common shares by George T. Cussen, officer, his total holding; acquisition of 500 common shares, total holding, by James E. Davidson, director.

General Electric Co. Acquisition of 2,136 common shares by W. R. G. Baker, officer, making a holding of 4,836; acquisition of 1,125 common shares by John W. Belanger, officer, making a holding of 5,026; acquisition of 690 common shares through exercise of option by Arthur F. Vinson, officer, making a holding of 1,827; acquisition of 1,695 common shares by William C. Wichman, officer, making a holding of 2,790.

B. F. Goodrich Co. Acquisition of 1,000 common shares by William F. Richardson, officer, making a total holding of 5,896.

Greer Hydraulics. Disposal of 500 common shares and $10,000 in 5½% debentures by A. Hawley Peterson, director, leaving a holding of 9,000 common shares.

Goodyear Tire & Rubber Co. Acquisition of 1,842 common shares through exercise of option by A. G. Cameson, director, making a holding of 4,611; acquisition of 2,500 common shares through option by Z. C. Ose Land, officer, making a holding of 3,426; acquisition of 152 common shares by John P. McWilliams, director, making a holding of 506; disposal of 2,000 common shares by E. J. Thomas, officer and director, leaving a holding of 3,945.

Lear, Inc. Acquisition of 509 common shares as compensation by Andrew F. Haiduck, officer, making a holding of 1,829; acquisition of 4,000 common shares through exercise of option by A. G. Handschumacher, officer, making a total holding of 5,500; acquisition of 6,500 common shares through option by Richard M. Mock, officer, making a holding of 12,533.

National Airlines. Acquisition of 1,200 common shares by Walter F. Johnston, officer, making a holding of 2,505.

Northeast Airlines. Acquisition of 1,000 common shares by Paul F. Collins, director, making a holding of 2,000.

Northrop Aircraft, Inc. Acquisition

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through exercise of option of 666 common shares by Kenneth P. Bowen, officer, making a total holding of 1,996; acquisition of 295 common shares through option and disposal of 300 by George T. Johnson, officer, leaving a holding of 316; acquisition of 660 common shares by exercise of option by Edgar Schmued, officer, making a holding of 1,320; disposal of 192 common shares by George Gore, officer, leaving a holding of 630.

Pacific Northern Airlines. Disposal of 1,700 common shares by M. B. Kirkpatrick, director, leaving a holding of 1,701.

Reynolds Metals Co. Acquisition of 533 common shares by W. G. Reynolds, officer and director, making a direct holding of 1,979 and a holding in trust of 2,633; acquisition of 4,268 common shares by R. S. Reynolds, Jr., officer and director, making a holding of 8,468; acquisition of 2,401 common shares by Walter L. Rice, officer and director, making a holding of 3,182.

Rohm & Haas. Disposal of 200 common shares by E. C. B. Kirsopp, director, making a total holding of 16,145.

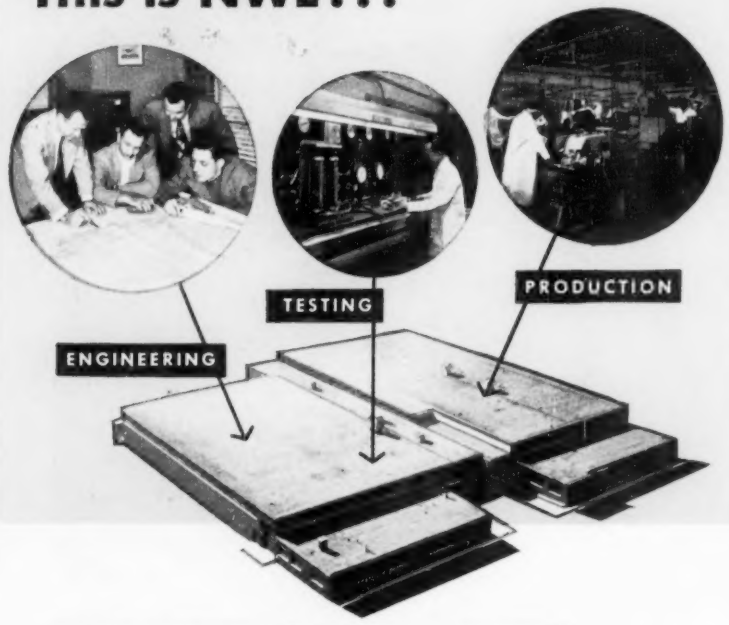
Sperry Corp. Acquisition of 850 common shares by George C. Delp, officer, making a holding of 3,202; acquisition of 1,200 common shares, total holding, by Bert T. Oakley, officer; acquisition of 1,400 common shares by Charles Ondrick, his total holding.

United Air Lines. Acquisition of 300 common shares by Martin C. Ansorge, director, making a holding of 501; acquisition of 100 common shares by Paul A. Bissinger, director, making a holding of 200.

United Aircraft Corp. Disposal of 4,800 common shares by Leonard S. Hobbs, officer and director, leaving a holding of 2,000; disposal of 1,500 common shares by William R. Robbins, officer and director, leaving a holding of 3,800.

Westinghouse Electric Corp. Disposal of 125 common shares by R. D. Blasier, officer, leaving a holding of 653; disposal of 721 common shares by L. E. Osborne, officer, leaving a holding of 3,143.

This is NWL . . .



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GE Aims to Cut Jet Development Knots

Faster and cheaper development of jet powerplants will be sought by General Electric Co., with a research or "demonstrator engine" program that skips production problems.

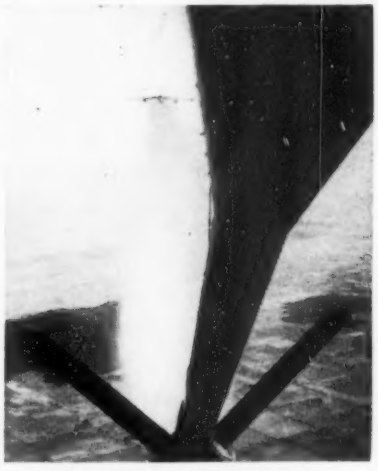
Recognizing that development of supersonic Mach 2 engines may be the biggest problem facing U. S. airpower today, GE proposes to ignore production while it designs better powerplants in an effort to put engine development more nearly in step with aircraft development.

▶ **First Step**—The decision to use unorthodox development procedures with a research engine program is a pioneering step that follows wide criticism in both military and industrial turbine research circles. The feeling has been widespread that improvements come too slowly and that a revolutionary jump in performance is vital to keep abreast of foreign competition.

In addition to the military, National Advisory Committee for Aeronautics and other independent agencies have favored research engine programs patterned after those used to develop radically new aircraft frames. They have encouraged engine manufacturers to abandon the evolutionary approach.

Highlights of the GE program as outlined before the Miami Aviation Assn. by G. E. Fouch, manager of the jet engine department of the Aircraft Gas Turbine Division, are:

• Production considerations will be



Rain in the Face

Boeing KC-97 tanker kicks up a rainstorm through its refueling flying boom during tests on improving methods of removing rain from windshield of B-47 Stratojet bomber. Stratojets now use arm-type wipers, but Boeing has been experimenting with rain deflectors, heated air blasts and water repellents for the six-jet bombers.

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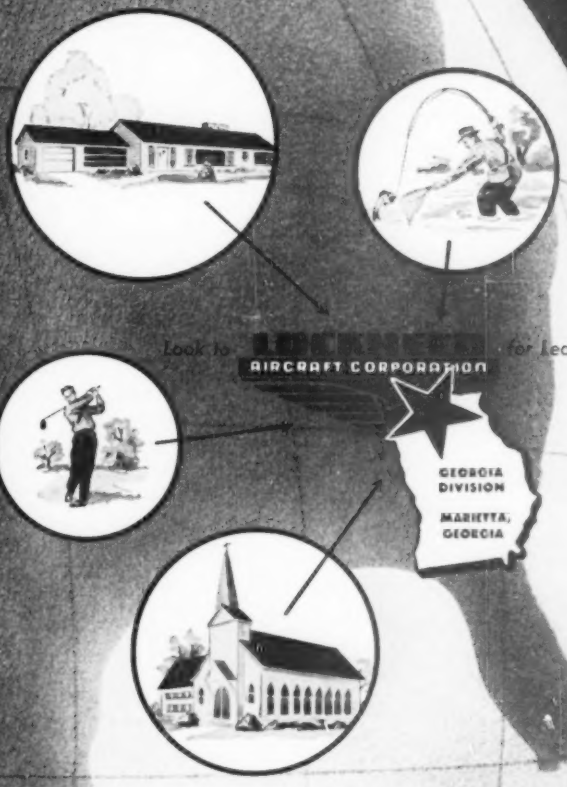

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4. AMONG THE LATEST FENWAL DEVICES are those pictured here — used in the newest research, Air Force, and civilian airline planes. The shell is the fast-acting temperature-sensitive element in all Fenwal units. They include Fire Detectors, Regular and Midget Over-Heat Detectors and cabin Heater Controls, to meet all aircraft temperature control and detection requirements. For complete data write **Fenwal Incorporated, 1211 Pleasant St., Ashland, Mass.**

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taken up only when an engine has been selected for production.

- The 5-yr. lead time now required to develop a new engine will be cut by a year, maybe more.
- There will be more advancement per dollar spent on development.
- More imagination will be used in design of jet engines.
- Technology will be broadened and more radical departures in powerplants will be tried.

By using the concept of the demonstrator or research engine, Fouch says, GE proposes to "investigate new principles, revolutionary new ideas, and put them together in actual new engines.

▶ **State of Art Improvement**—"Since we will not have to belabor the problem with production considerations every step of the way, we will be able to try high-risk items and explore possibilities for entirely new engines. Since we will not have to tailor our ideas to a production framework, we will be able to progress much faster.

"Most important of all, we can put together a 'dream' engine—a radical departure from existing designs—and see if it works. We won't be restricted by the present 'state of the art' and we can ignore production requirements when we see fit. We will be ready to improve the state of the art rather than to maintain the status quo."

Fouch believes that as engine designers work harder to turn out efficient Mach 2 powerplants they will find that it no longer will be possible to let engine development lag far behind airframe progress (AVIATION WEEK June 21, p. 14). GE opinion, he says, is that the powerplant is assuming greater importance and the traditional dominance of the airframe over the engine will be reversed.

▶ **Products Nobody Needs**—History of jet development, he points out, is one of "crash" programs, with the result that it tends to be hampered by a "creeping conservatism" and the 5-yr. lead time has been accepted to the limit.

During the 5 years, Fouch says, "every step in the development process is slowed by being saddled with production considerations.

"Every innovation must be weighed from two aspects, its contribution to the advancement in the state of the art and the degree of difficulty in mass-producing it."

The result of this, he believes, is that the effort to keep development and production phases in step results in "a highly producible product which nobody needs."

What GE proposes to do, according to Fouch, is to put high speed into engine research, similar to that put into airframe development by the industry in recent years.

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Subassembly of B-57 wing designed and fabricated for The Glenn L. Martin Company

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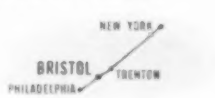

On the mainline of the PRR, midway between Trenton, N.J., and Philadelphia, Pa.

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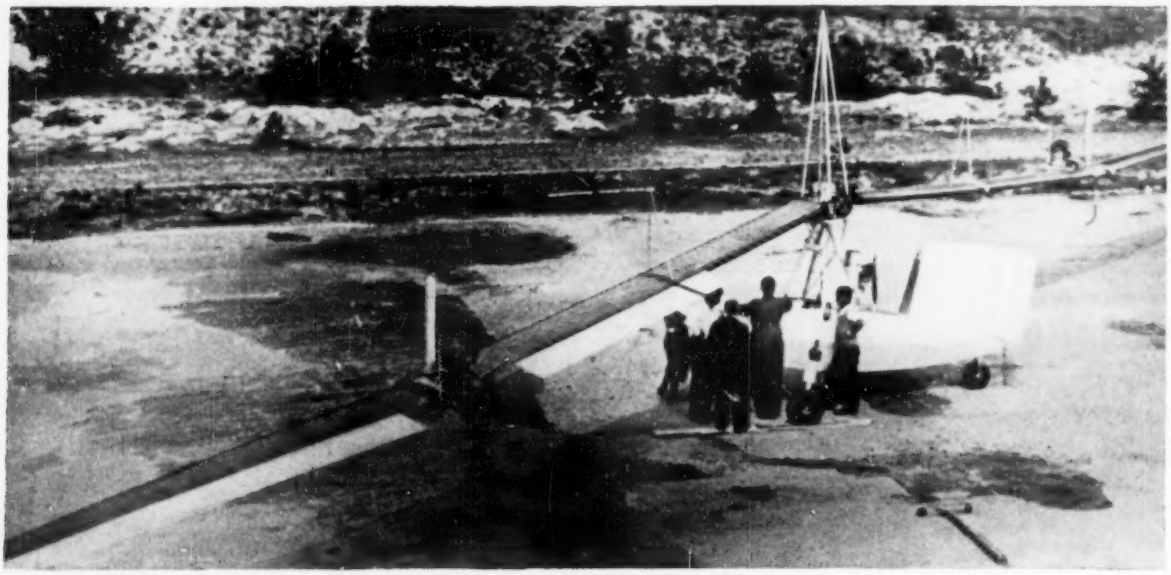


FLETTNER GIANT with 100-ft.-dia. rotors flew tethered in 1933; blades were hinged at root and outboard of engines.

German Rotorcraft Pioneer Comes Back

By David A. Anderton

Kew Gardens, N. Y.—Anton Flettner, pioneer German developer of rotary-wing aircraft, is back in business with an engineering firm of young enthusiasts and a military contract for helicopter designs.

Around the intermeshing-rotor system—developed by Flettner in 1937—and other types of rotors, the company is designing a family of large helicopters with 40-troop capacity. The designs will feature a long-life transmission, says Flettner, which should show thousands of hours of trouble-free operation without the need for gear replacement. He attributes this extended design life to a different concept of gear loading.

ANTON FLETTNER: 25 years of copters.

With such ideas and a collective background of many years in rotary-wing development, Flettner Aircraft Corp. is making a strong bid for recognition.

▶ **Copter Pioneering**—Flettner's work in the rotary-wing field dates back almost 25 years, and qualifies him to be placed on the list of engineers who made the helicopter a practical vehicle. Working under military contracts with the German Air Ministry, Flettner designed, built and accumulated much flight time on operational helicopters before Sikorsky had finalized the configuration of his single-rotor VS-300.

The Flettner 282 helicopter, an intermeshing-rotor configuration, was produced during the early years of World War II in quantity. Built in 24 different variations, the FL-282 was used by the German military for learning about and developing the copter as a vehicle.

Flettner helicopters saw much service in the Mediterranean as convoy escorts on anti-submarine patrol, marking the first such use. (Flettner says that the Germans saw the value of rotary-wing craft for that work as early as 1932.) They were flown off platforms erected on cruiser decks. No helicopters were lost during the operations from any mechanical failures.

▶ **First Design**—But Flettner had built helicopters long before this. His first design was a giant, with a 100-ft.-diameter rotor powered by reciprocating engines partway out along the blades. This work was done in 1932 and 1933; tethered test flights were made in 1933 and 1934, and looked good. But this

> **The first notable strides (in helicopter concepts) were made by Breguet in France and Focke in Germany, the former representing the dual-rotor coaxial machine, and Focke having a side-by-side configuration. . . .**
>
> **Subsequently we find Fleftner's intermeshing configuration coming with a compromise of the Breguet and Focke configurations. . . . Breguet had rotor-tip clearance problems. . . . Focke had problems of control, maneuverability and performance . . . Flettner in his configuration of close side-by-side rotors came forth with the advantages of both systems as to symmetry but without the principal disadvantages of either system.**
>
> **The Flettner helicopter was an extremely interesting machine. . . . It was extremely maneuverable and possessed ease of control and stability which was quite outstanding.**—*From a paper prepared for the American Helicopter Society by Charles H. Kaman, president of Kaman Aircraft Corp.*

FL-185 HELIGYRO: Two gyro-controlled props automatically counteracted torque and added thrust for forward flight.

FL-184 AUTOGYRO: First flown in 1935, this pioneering aircraft featured cyclic-pitch control for the rotor.

FL-265 HELICOPTER landing on platform above cruiser gun turret during demonstrations just before World War II.

was a private venture, and its development was curtailed when the German government channeled Flettner's activities into helicopter development for anti-submarine work.

This led to the FL-184, first autogyro with cyclic pitch control, which flew in 1935 and 1936. The first Heligyro, an aircraft with power distributed to both rotor and propellers for forward flight, was a Flettner design. Designated the FL-185, it first flew in 1936.

▶ **Intermeshing System**—The intermeshing-rotor configuration, familiar in this country because of its use on the Kellett XR-8 and the Kaman line, was conceived by Flettner in 1937. The first copter design using the principle was the FL-265; six were built and test-flown—first flight was in May 1939—racking up what was then tremendous flight experience in rotary-wing aircraft.

First autorotative transition was made with the FL-265 in August 1939. Flettner says that in June 1941, for the first time in helicopter history, a transition to autorotation and back to helicopter flight was accomplished. He feels that this date established the helicopter as a practical aircraft.

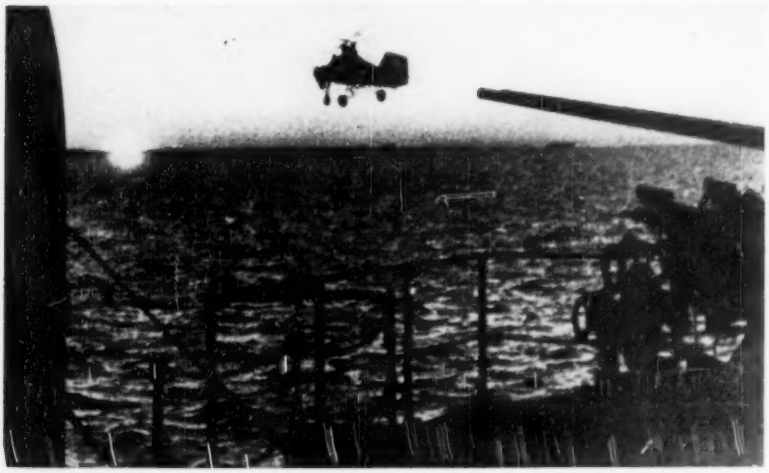
FL-282 HELICOPTER: Production version shown here was mainstay of German copter force in World War II; craft was built in 24 different models.

Work done with these prototypes stimulated further interest by the German brass, and Flettner got development and production contracts for military machines that saw much service during the war.

From the beginning of his work, Flettner had a strong engineering team. He gives special credit to Dr. Kurt Hohenemser, now deep in rotary-wing research for McDonnell Aircraft Corp.'s Helicopter division, and Dr. Gerhardt

Operations in World War II . . .

FL-282 HELICOPTER is assembled on cruiser deck by ground crew technicians.



RETURNING, the copter approaches platform on gun turret where ground crew . . .

HOOKS ON to hovering craft. Pilot increases lift to maintain tension in cable and copter is winched down. Technique was developed for rough-sea operations.

Sissingh, now with Kellett Aircraft Corp.

► **Early History**—Most people associate Flettner with wind-driven rotors for ship propulsion; his aircraft connections are hardly known.

But his experience goes back almost half a century, because in 1905—fresh out of the State Seminary in Fulda-Hesse—he joined Count Zeppelin to work on remote control of lighter-than-air craft.

During the first World War, he served in the German Air Ministry as leading engineer on pilotless aircraft development. During that time he invented the tab control for aerodynamic control surfaces; its use on many German aircraft started a flow of royalty fees founding the fortune that would later finance his helicopter work. The Flettner tab is in use today on almost every aircraft in the world.

► **Wartime Years**—During the World War II development of the intermeshing-rotor system, Flettner was asked to study jet-driven rotors. Two of his top technicians were loaned to Fritz Doblhoff, then working with pressure-jet drives. Flettner himself was asked by the German Air Ministry to study pulsejet applications.

But he now regards jet drives as a future possibility. "Research and development on jet drives is a good thing for now," he says in broadly accented English, "but if you want to drive helicopter rotors today, gears are the way to do it."

Toward the end of the war, Flettner ran afoul of some of the specialized philosophies of the Third Reich and took to the hills of Bavaria just in time. His factory in Berlin had been lost to bombing, his workers were dispersed or drafted, and there was little hope left.

He lingered in Bavaria for a while, studying and reviewing the intermeshing rotor problems, until in 1947 he emigrated to this country and was named as a consultant to the Office of Naval Research.

► **Postwar Years**—For ONR, Flettner proposed a lifting system combining a rotor and fixed wing, using the wing to unload the rotor in forward flight. (This principle is currently applied in the McDonnell XV-1 convertiplane.)

By 1949, Flettner was able to form his own business again and to start engineering studies. Associated with him is Vice Adm. C. E. Rosendahl (Ret.) as vice president, famed for his continuing efforts on behalf of dirigibles and blimps. Eugene Liberatore is assistant director of engineering; Flettner is director of engineering and president.

Since its inception, the company has done work for the Navy on classified applications for turbojet drives for large rotors; a series of tests was performed

FIRST PAN AM SUPER STRATOCRUISER to use the new G-E turbosupercharger is the "Clipper Mayflower." Improved turbo allows cowl flaps above mechanic's head to be drawn in closer to the engine to reduce drag.

NEW G-E turbosupercharger kit boosts Stratocruiser's speed, range and payload

Now . . . at no increase in operating cost, Pan American's Boeing Super Stratocruiser fleet can make daily, non-stop flights from New York to Europe.

General Electric's new CH-10 modification kit contains all parts needed to install *a slightly larger turbine wheel* to replace the one now used in Boeing Stratocruiser turbos. This new wheel reduces back-pressure on R-4360 engines. It lowers engine cylinder temperatures. By reducing cooling air requirements, it permits drawing the cowl flaps closer to the engines to reduce drag, increase flight speed.

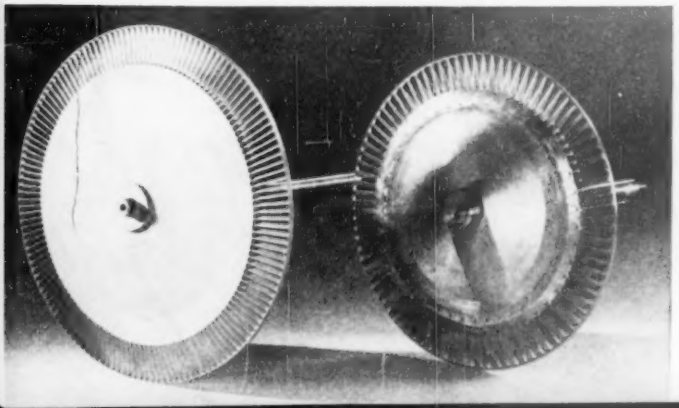
On Pan American's forthcoming Super Stratocruiser flights from New York to London and Paris, the CH-10 turbosupercharger helps make possible a 95-mile range increase; a five-knot speed increase; plus several hundred extra pounds of load capacity. Now it is possible, also, for Super Stratocruiser flights to bypass the traditional West/East refueling stop at Gander, Newfoundland—*a stop all other un-modified Stratocruisers continue to make!*

For further application data on the CH-10 modification kit, contact a G-E Aircraft Specialist via your nearest G-E Apparatus Sales Office. If you wish, write to *Section 231-2, General Electric Company, Schenectady 5, N. Y.*

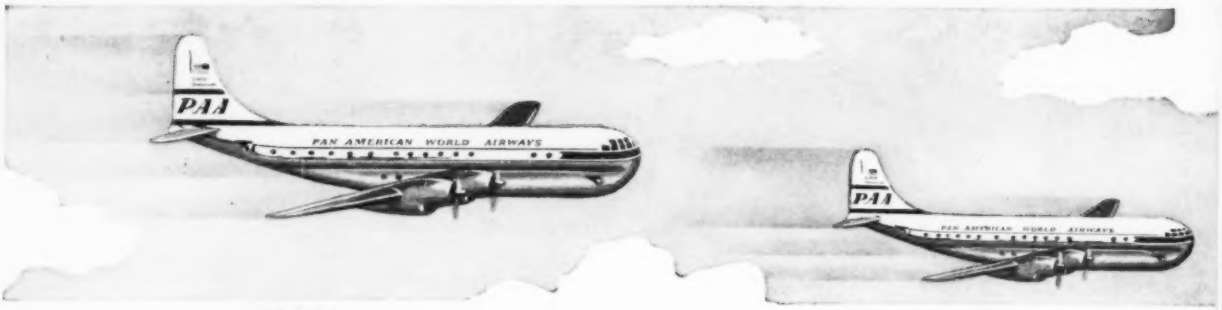
Progress Is Our Most Important Product

GENERAL ELECTRIC

LARGER TURBINE WHEEL (left) is key component in General Electric modification kit. It's easy to install—only four parts must be replaced.



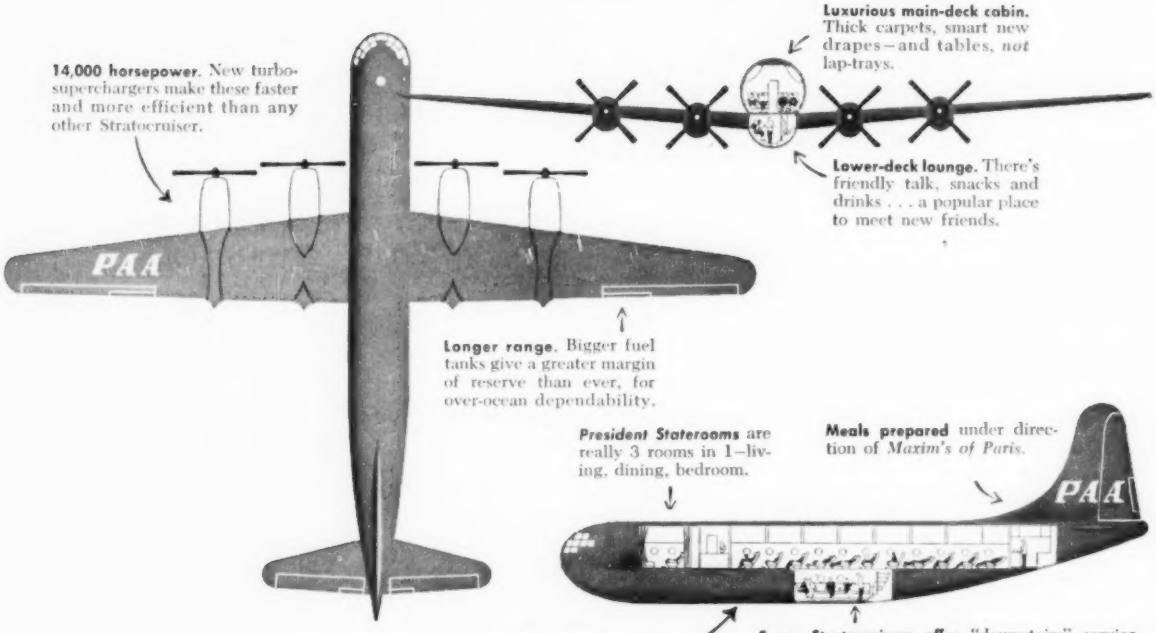
TRANS-ATLANTIC PAN AM FLEET will be fitted with CH-10's by Dec. 15. U.S. Air Force planes offer other possible applications.



Now... super-powered SUPER

NON STOP to PARIS or

World's quietest, most powerful,



14,000 horsepower. New turbo-superchargers make these faster and more efficient than any other Stratocruiser.

Luxurious main-deck cabin. Thick carpets, smart new drapes—and tables, *not* lap-trays.

Lower-deck lounge. There's friendly talk, snacks and drinks . . . a popular place to meet new friends.

Longer range. Bigger fuel tanks give a greater margin of reserve than ever, for over-ocean dependability.

President Staterooms are really 3 rooms in 1—living, dining, bedroom.

Meals prepared under direction of *Maxim's of Paris.*

Everybody sleeps in a Sleeperette service easy chair or in a berth that's bigger than on a train!

Super Stratocruisers offer "downstairs" service. There's room to walk around on these giant airliners! Come down the circular staircase anytime to the lower-deck lounge for extra relaxation.

The Super Stratocruisers are exclusive with

PAN AMERICAN

World's Most

STRATOCRUISERS

LONDON AT NO EXTRA COST

most comfortable, over-ocean airliners

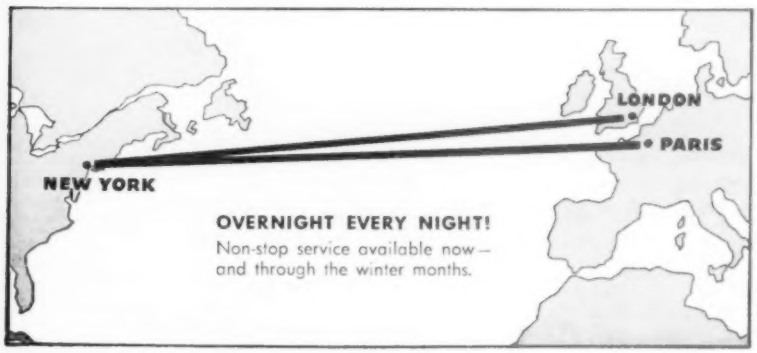
Nightly to LONDON! Five a week to PARIS!

● By December 15, Pan American's new fleet of *Super* Stratocruisers will be flying *daily* to Europe on regular NON-STOP schedules.

These great airliners are superpowered. Each is equipped with 4 new turbo-superchargers—new propellers—more fuel capacity for increased over-ocean dependability.

This means you can now enjoy quiet, restful sleep as you fly on, high above the weather, to PARIS OR LONDON. You'll land refreshed, ready for work or fun, in the morning . . . because you will have crossed the Atlantic NON-STOP!

An all-sleeper service. Stretch out your feet as far as you can—yours can't touch the seat in front! Yours reclines to *bed-length!* That's Sleeperette* service . . . another Pan Am exclusive. If you choose, reserve a berth—foam-soft—at slight extra cost.



Superb "President" service. Cocktails, or your favorite refreshment, appear tinkling at your elbow. With hors d'oeuvres, of course. Then, somehow, you sense Paris is near. Meals prepared by renowned *Maxim's of Paris* are being served! Whether it's *Breast of Chicken Veronique—Filet Mignon Rossini*—or some other specialty—*Maxim's* gives it a unique touch of excitement and romance.

Staterooms available. Want to be alone? You can be, with your wife or business companion, in the seclusion of a *President Stateroom*, designed by Dreyfuss. Lounge chairs, both upper and lower berths—retire when it suits you best—generous shelf and closet space, private wash basin, private bar, special service. Just $125 extra for double occupancy.

Choice of service. Ten flights each week are by regular, first-class *President* service . . . two a week are by the famous *President Special*, a deluxe, extra-fare flight. You may use the popular Pan Am "Pay-Later" Plan to finance your trip, if you wish.

FIRST ON THE ATLANTIC . . . THE PACIFIC . . . IN LATIN AMERICA . . . 'ROUND THE WORLD

Experienced Airline

*Trade-Mark, Reg. U. S. Pat. Off.

The airliner that pioneered scheduled jet stream flying

Four months ago, Pan American World Airways was awarded the coveted Frye Performance Trophy for pioneering jet stream flying in regularly scheduled service. The airplane which teamed with Pan American's flight planning leadership to make this type of express operation possible is the Boeing Stratocruiser.

Long noted as an outstanding long-distance, high-altitude luxury liner, the Stratocruiser spans in this jet stream schedule the longest route flown by a U. S. certified commercial airline – Tokyo to Honolulu, a distance of 3,846 statute miles. And in flying this seasonal seven-league route, Pan American's veteran Stratocruiser fleet logs the fastest block-to-block speed now scheduled for any airplane, 344 miles per hour.

Now the Stratocruiser's high performance is being further stepped up. Installation by Pan American of new turbosuperchargers, new propellers and extra fuel tanks will permit daily flights to Europe of *their* New Super Stratocruiser on nonstop schedules.

Stratocruisers are in demand because experienced travelers appreciate the comfort of more restful seats and extra leg room. They appreciate the wider aisles and the greater freedom of movement made possible by the big Boeing's lower-deck lounge. And they like the quiet of these big airliners – which have a lower sound level than that of other commercial aircraft.

BOEING

using off-the-shelf Westinghouse turbojets. But primarily, Flettner's goal has been the continued refinement and development of his first love, the intermeshing-rotor configuration.

He believes now that the system is nearing practical application on large helicopters in three-bladed rotor systems; his new designs for 40-passenger craft show that kind of a layout.

BuAer Contracts

The following contract awards of $25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

AIRESEARCH MFG. CO., Los Angeles 45, gas turbine units, 65 ea., $1,124,246.

BARTH ENGINEERING and MFG. CO., Milldale, Conn., radiosonde-rawin adapter system, 1 ea., $29,814.

ECLIPSE PIONEER DIV., Bendix Aviation Corp., Teterboro, N. J., gyro horizon indicators, spare parts, 2,893 ea., $1,635,182.

CONTINENTAL AVIATION and ENGINEERING CORP., Detroit, services of technically trained employes to instruct Naval and Marine Corps personnel, 4 ea., $49,920.

CONVAIR DIV., General Dynamics Corp., San Diego, Calif., study of problems on flexdeck operations, $37,987.

GRUMMAN AIRCRAFT ENGINEERING CORP., Bethpage, L. I., N. Y., airplanes, spare parts, etc., 28 ea.

HILLER HELICOPTER CORP., Palo Alto, Calif., helicopters, service manuals, handbooks, 10 ea., $552,630.

LAND-AIR, INC., Chicago 6, services of factory trained field technicians to instruct Naval and Marine Corps personnel, 54 man-months, $74,566.

LOCKHEED AIRCRAFT CORP., Burbank, Calif., airplanes, spare parts, etc., 8 ea.

NORTH AMERICAN AVIATION, INC., Downey, Calif., vertical speed indicators, reports drawings, 2 ea., $25,043.

RCA SERVICE CO., INC., Camden 2, N. J., field engineering services for technical assistance and instruction, 852 man-months, $833,680.

Handle With Care

All incoming packages received by Boeing Airplane Co., Seattle, that require special handling bear the eye-catching label, "Measles"—a code that warns personnel to check the proceedure for handling this material. It may be inspected merely for breakage, then sent to functional test or assembly lines. Or the instructions may be to send it on unopened. Boeing supplies the code stickers to vendors.

A GREAT TEAM!

Republic F-84 Thunderstreak

and
White Industries'
Power and Phase Converter

now at a new low price!

THUNDERSTREAK JETS GET PLACES FAST — speeds of over 650 MPH at altitudes of over 45,000 ft. Under these extreme conditions the constant accuracy of every flight instrument is VITAL! Instrument failure or lapse could mean a lost battle or a lost aircraft. This is why Republic and other leading aircraft manufacturers cut excess weight and cost by installing the New White Power and Phase Converter ... single phase power is precisely and dependably converted to the 3-phase delta connected power needed to operate all types of instruments.

The White Industries converter boosts your payloads and slashes your costs by —

- **Saving at least 13 lbs. in each installation.**
- **Eliminating maintenance costs—no moving parts.**
- **Reducing equipment investment—simplifies original equipment.**
- **Adjusting units to your specs—lowering installation time.**
- **Offering lowest market price per unit.**

Constant high precision plus immediate delivery from stock at new low prices (according to quantities) are the important results you gain from the sweeping engineering advances and techniques innovated by White Industries.

Start boosting your payloads and cutting your ultimate costs today ... write for complete Power and Phase Converter technical information and prices TODAY!

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and others

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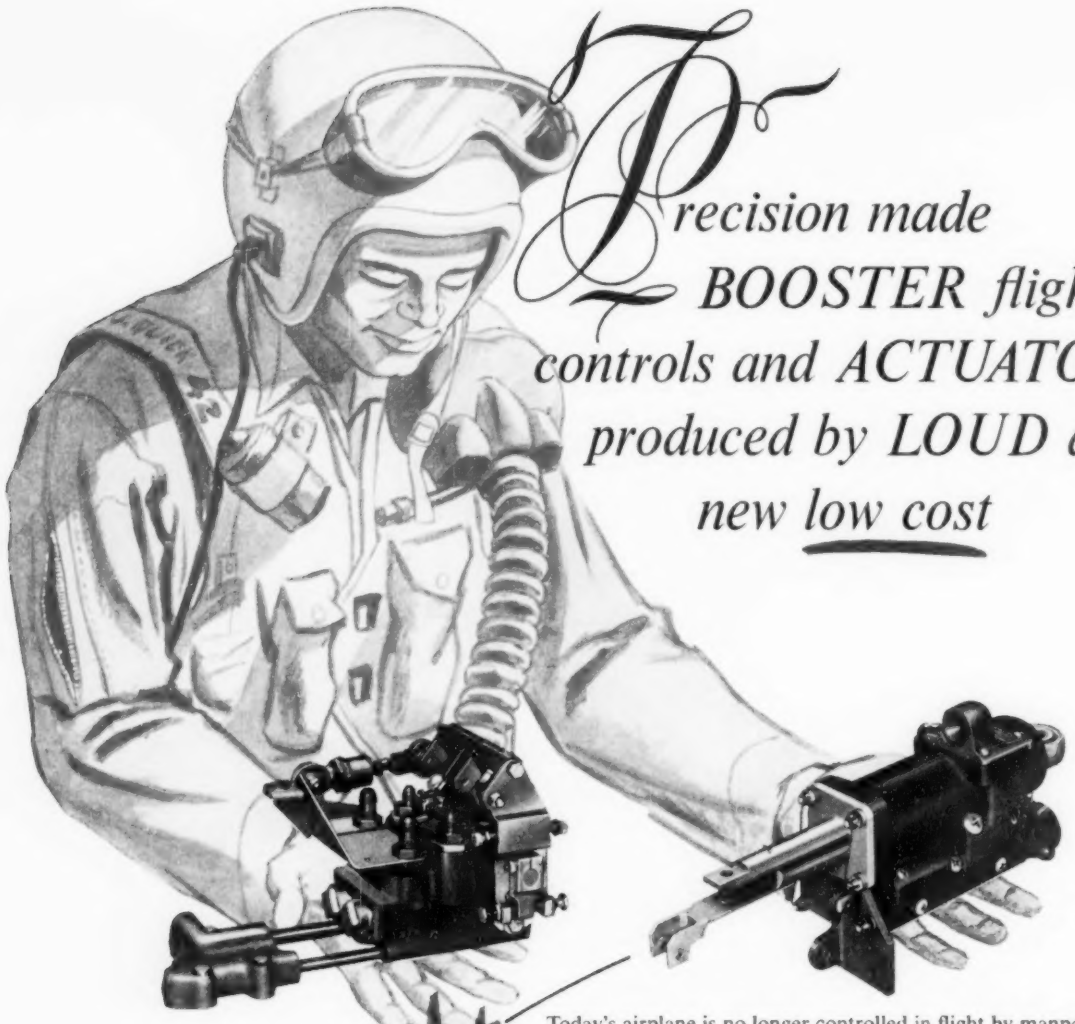
WEST COAST SALES: W. V. Gilbert Co., 6214 W. Manchester Ave., Los Angeles 45, Calif. MIDWEST SALES: Cairo Sales Co., 3020 N. Cicero Ave., Chicago 41, Ill.



Precision made BOOSTER flight controls and ACTUATORS produced by LOUD at new low cost

Today's airplane is no longer controlled in flight by manpower alone. Hydraulic power is now widely employed to provide control surface power made necessary by larger surfaces and higher speeds.

This substitution of manpower with hydraulic power has made the production of high precision hydraulic components vital. Loud is now producing this equipment with diametral tolerances of .000025 inches and controlled clearances of .00005 inches on a quantity production and quality controlled basis. Linear tolerances in valving of .00005 inches insure controls of instantaneous and identical response.

Loud's complete facilities from raw material to finished product, a machine for every job, plus years of experience has made it possible to produce these precision assemblies for the aircraft industry at mass production prices.

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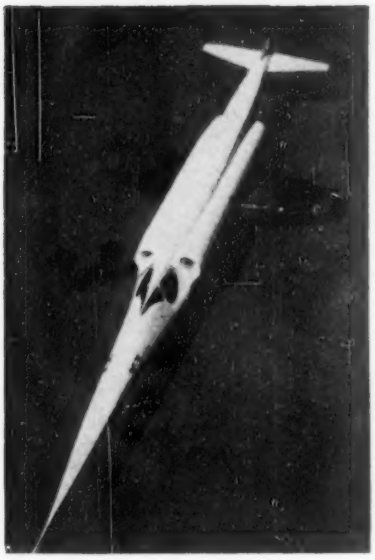
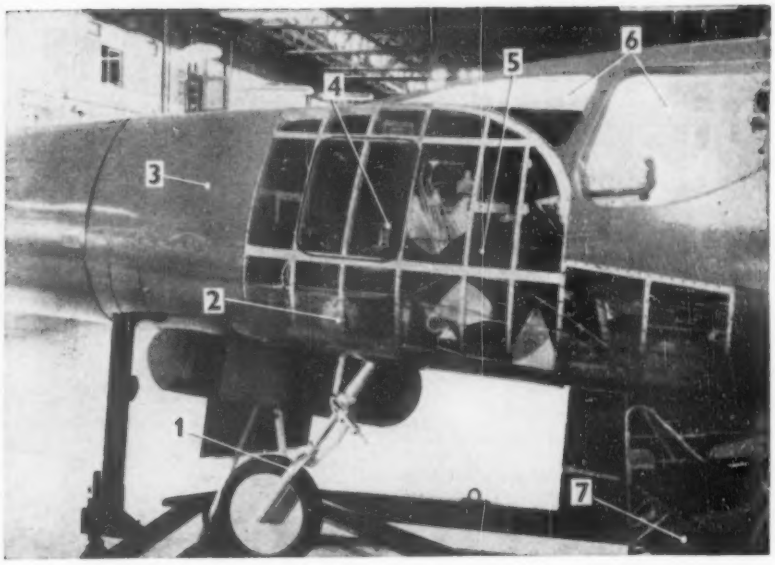




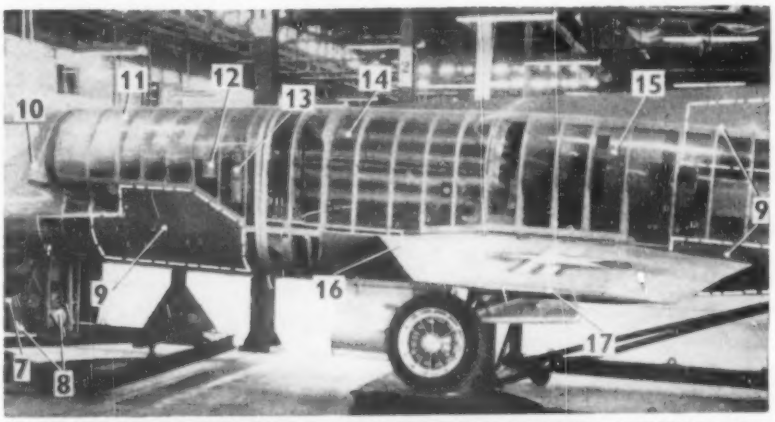
Mockup Reveals Douglas X-3 Makeup

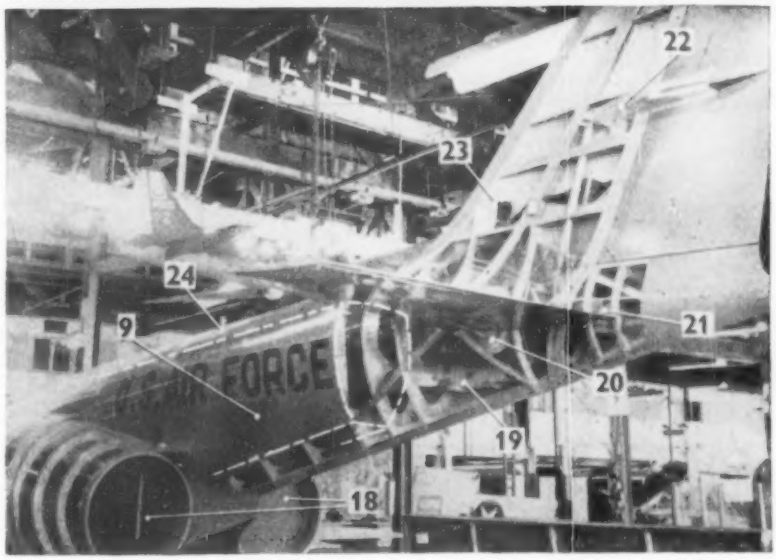
Makeup details of the Douglas X-3, tapered-nose research plane, are revealed in the three accompanying photos of a full-size mockup of the craft.

The model shown here, known as 39C, was completed about six years ago, and though not identical with the actual aircraft is substantially similar.

The following notes are keyed to the numbers in the pictures.

1. Nose gear retracts forward for housing under fuselage nose section.
2. Regulator for pressurization of cockpit.
3. Telemetering and recording equipment are in nose base and sections forward.
4. Switch used to turn off instrumentation during ground test, to prolong battery life.
5. Hydraulic and vacuum lines for a variety of services.
6. Plate glass for windscreen and side panels.
7. Pilot's seat ejects downward for escape.
8. Bottles for oxygen and nitrogen. Oxygen bottle is for pilot use during descent after ejection; nitrogen is used to operate stabilizing fins on seat as pilot "flies" it down.
9. Fuel areas, indicated by dotted lines.
10. Boundary layer bleed scoop at fuselage side.
11. Air intake duct for turbojet engine.
12. Hydraulic reservoir.
13. Hydraulic accumulator.
14. Tubes conduct cooling air from bleed scoop back to plenum chamber surrounding afterburner.
15. Plenum chamber cover.
16. Leading edge flaps on wing panel.
17. Modified double wedge airfoil shape is shown at wing tip. Wing and fuselage material basically is unclad 24S-T4 alloy.
18. Engine exhausts for twin turbojets.
19. Horizontal stabilizer power unit.
20. Bearing for stabilizer rotation.
21. Rudder hydraulic actuating mechanism.
22. Hydraulic damper to counteract flutter.
23. Instrumentation tubing.
24. Tunnel located here for cables, etc.





THIRSTY
THROATS
A jet engine, operating at extreme speed and altitude, is a thirsty throat rapidly consuming large quantities of fuel and air. *Everything* depends on keeping this throat fed . . . and this demands a Main Fuel Pump that will deliver *without fail!* Designing, developing and producing these pumps — and other vital fuel control systems — "CECO" is helping America achieve mastery in the air. Our complete and fully integrated engineering-production team is available to help you.
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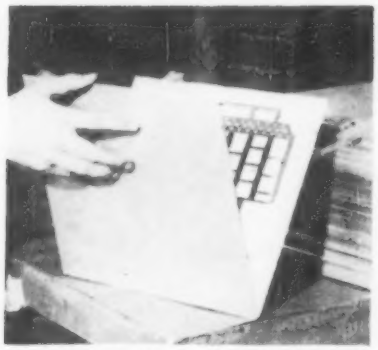
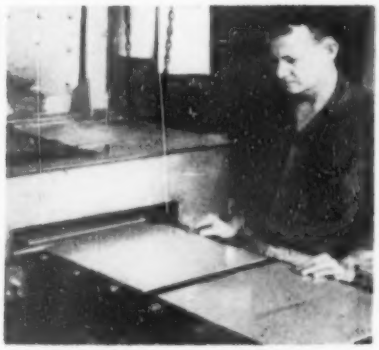
JET ENGINE FUEL CONTROLS • AFTERBURNER CONTROLS
PUMPS • SERVOMECHANISMS • CARBURETORS • PROTEK-PLUGS

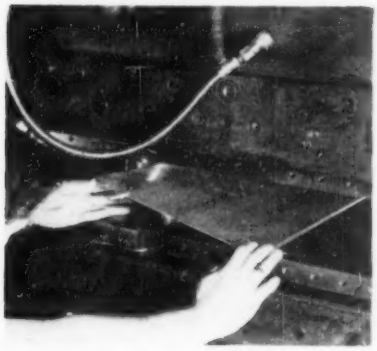
1. STOP-WELD PATTERN will be applied to metal sheet through silk screen.



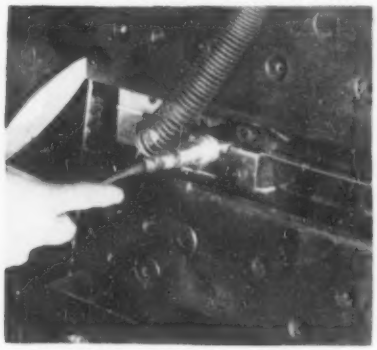
2. 'PRINTED' SHEET and plain sheet make a sandwich for roll bonding operation.



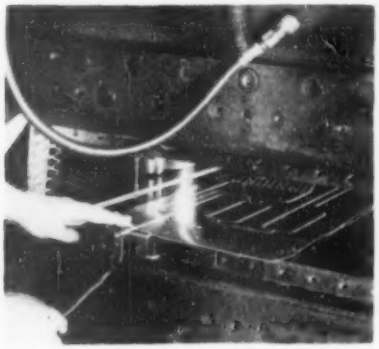
3. SANDWICHES get hot rolling, which fuses them; cold rolling lengthens them.



4. NEEDLE has been inserted in left corner of sheet at lead-in of stop-weld pattern.



5. PRESSURE, which is applied through hollow needle, will dilate stop-weld pattern.



6. INTEGRAL TUBING appears in sheet, following along lines of stop-weld pattern.

Hydraulic Tubing 'Printed' in Metal

By Irving Stone

A new production technique for creating a pattern of tubing within a sheet of metal promises some interesting potential uses in airframes and aircraft equipment.

A development of Olin Mathieson Chemical Corp.'s Metals division, the new process combines roll bonding and silk screen printing to achieve its aim. By roll bonding, two or more sheets are squeezed under heat and pressure until they become physically one. By silk screen printing, the desired tubing pattern is incorporated in the sheets, ready to be blown up like a balloon.

▶ **Aircraft Promise**—The process has already produced tremendous savings in time and money in the production of civilian refrigeration equipment. It appears to offer considerable promise for aviation. Some possible applications:

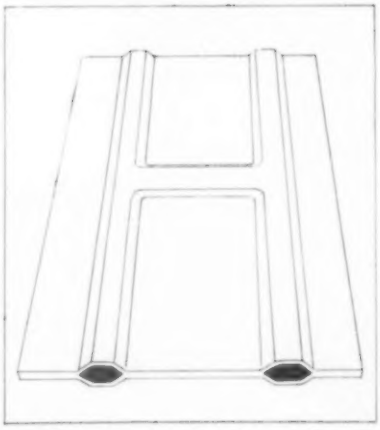
• **Structural cooling** of wings and fuselage of highspeed planes. As speeds of aircraft rise—particularly in the military field—effects of aerodynamic heating will become an increasingly difficult problem. The new tube-sheet combination might be adapted to carry a fluid cooling medium to counteract skin temperature rise

Lockheed Aircraft Corp. and another major aircraft builder are reported to be testing the integral tube-sheet scheme.

• **Missile cooling.** Re-entry temperatures on skins of high-flying missiles as they return to denser atmosphere will pose an increasing problem with metals, particularly in the nose portion surrounding the warhead. Sheet that is smooth externally, with integral tubing on the inside surface, might be adapted for a cooling scheme.

• **Avionic equipment cooling.** A chassis for an avionic package, incorporating integral tubing for conducting a cooling medium, offers an attractive possibility. Today's small avionic packages, coupled with higher power consumptions, generate heat problems in both aircraft and missiles, which are proving difficult to overcome with ram air as the temperature of the latter rises with increasing vehicle speeds. The new tube-sheet combination might easily be adapted for air conditioning and fluid cooling systems.

• **Heat exchangers.** The integral make-up of the tube and sheet would seem to offer interesting applications in the general field of heat exchangers for aircraft. Advantages seen are minimum



SECTION of tube-sheet combination, showing how stop-weld areas give passage.

possibility of leakage, little maintenance, small size units.

• **Boundary layer control.** Using the new scheme, airfoils could incorporate a large pattern of tubing in the skin for suction action to induce smooth flow over the wing.

• **Corrugated structure** integral with skin for increased stiffness. A "beading" effect could be put on one side of the sheet for greater rigidity, leaving the other (exposed) side smooth for minimum drag characteristics.

▶ **Many Metals**—Olin Mathieson reports that the process has been applied to aluminum alloys (2S, 3S, 24S, 61S, 75S), stainless and carbon steels, copper and copper-zinc combinations.

Hundreds of aluminum samples illustrating the technique, at a cost of about $25 plus a nominal charge for the metal, already have been distributed, it is reported—an effective method of familiarizing industry with the finished product.

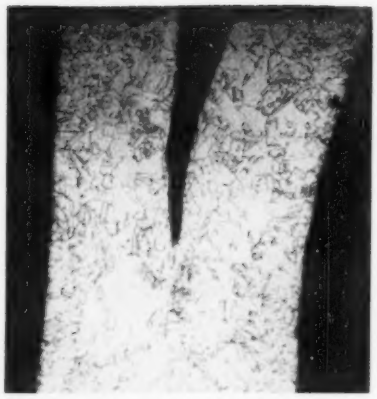
▶ **Proved in Refrigerators**—The process, a new application of roll bonding of metals, is already being used to make parts for refrigerators. For new evaporator plates, Olin Mathieson reports that the process has reduced retooling costs from $50,000 to $50, cut retooling time from six months to one week, increased efficiency of plates by more than 25%. In the evaporator application, sheet thickness is .060 in.; wall thickness of the tube is .030 in.

A new plant, slated for production in the near future, is now under construction at the company's East Alton, Ill., site, to turn out parts for various industries.

▶ **How It's Done**—Steps involved in the basic process of producing integral tube-sheet combinations are as follows:

• **Two flat sheets** of metal are cut to size and cleaned.

• **Tubing pattern** is printed on one of the sheets with the silk screen process. Key feature in the operation is to preplan the pattern, so that when it is elongated, tube layout of the desired proportions is obtained.



MAGNIFIED section reveals metal fusion and dilated stop-weld area (black).

• **Paint that is used** to apply the pattern is a stop-weld material (graphite is one component). A surface painted with it will not bond to another sheet of metal under heat and pressure. The stop-weld paint is squeegeed onto the sheet with a rubber roller.

• **A metal sandwich** is formed by placing the patterned face against another, a plain sheet. Spotwelding is used to hold the two sheets in proper relative position.

• **Hot rolling** of the sandwich produces a complete bond, except at those areas where the stop-weld pattern has been applied. The fusion of the metal, where there is no stop-weld, is such that, under a microscope, the grain resembles that of a single sheet of metal, it is reported. Mathieson says that as many as six sheets can be bonded at one time. Parallel or multiple tubes, running at right angles in two or more layers, can be produced.

• **Subsequent cold rollings** reduce the homogenous sheet to the required thickness. After annealing, one end of the metal sheet is trimmed to bare the lead-in end of the stop-welded pattern.

• **A hollow needle** is inserted into the bared end of the stop-weld pattern and the sheet is placed between platens in a hydraulic press. The platens are separated by shims to control the height of the tubing inflation; the hydraulic press merely serves as a holding medium for the platens and restrains their movement.

• **Hydraulic pressure** applied through the needle in the end of the sheet inflates the non-fused (stop-weld) area, thus forming tubing where the stop-weld material was applied. The integral tubing is flushed out to remove the stop-weld material, then thoroughly dried.

Mathieson reports that it can handle sheet up to 36 in. by 110 in., and has inflated integral tubes measuring up to 2½ in. across. Tensile tests have shown that the tube will rupture, but the bond will hold, it is claimed.

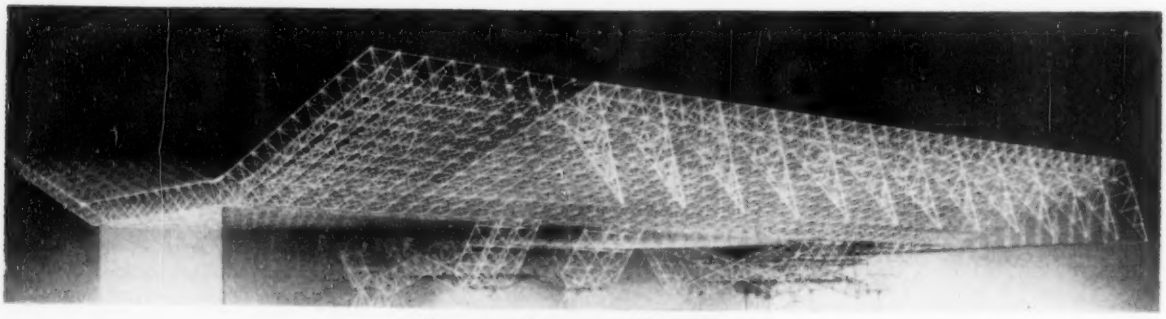
▶ **Tubes on One Side**—Bending of the flat tubed sheet barely lessens the tube opening, the company says. For the aircraft industry, it would seem more feasible to form the bonded sheets to the contour desired, then inflate the areas having the stop-weld material between the faces.

Olin Mathieson says the process is easily adapted to produce tubing on one side of a sheet, leaving the other surface flat. This, of course, would be desirable for aircraft and missile outer skins.

Apparently this is done by holding the sheet between a steel platen on one side and a rubber pad on the other during inflation. The pattern then appears on the rubber side.

▶ **Highly Conductive**—The company points out that since the sheet and tube produced by its new fabrication method are homogeneous, they provide maximum heat conductivity.

When tubes are joined to an evaporator plate by the customary methods—welding and brazing—air spaces are created between tube and plate, decreasing the material's conductivity.

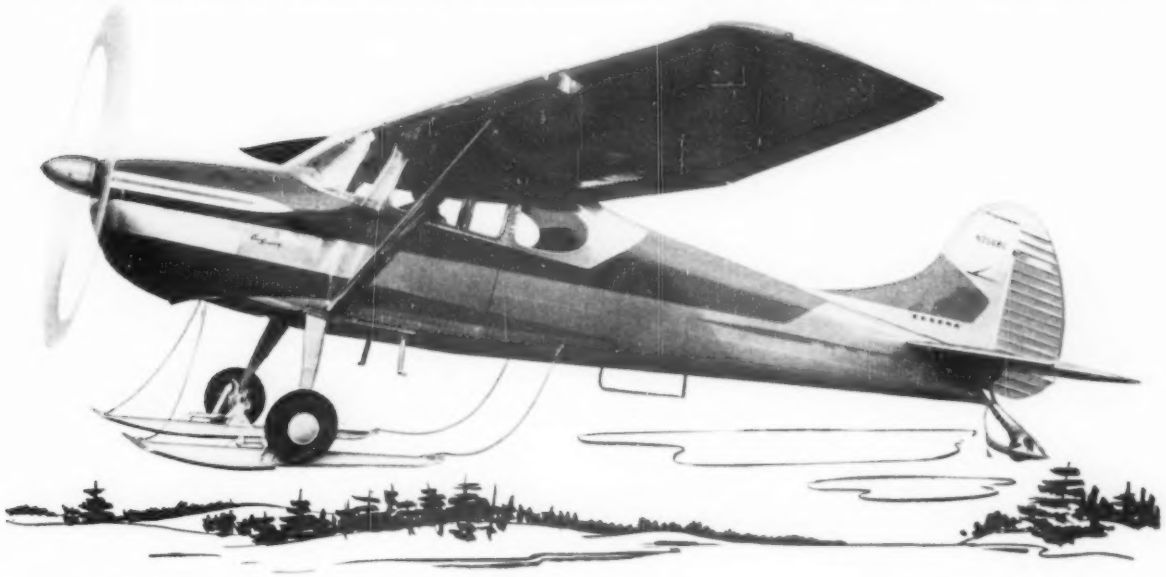


Space Frame Hangar

This four-dimensional maze is a new type of dismountable hangar developed for the USAF by the Institute of Design, Illinois Institute of Technology, Chicago. Structure is modular and built-up from tubular shapes integrated with a new type of connector designed by Konrad Wachsmann, director of the project. The hangar shown here in model form will handle six Convair B-36 bombers, plus a number of other smaller planes. Dimensions are 805 ft. long by 387 ft. wide. Each cantilever overhang is 150 ft. long. The building can be opened on four sides; doors are then stacked in the center of the hangar side.

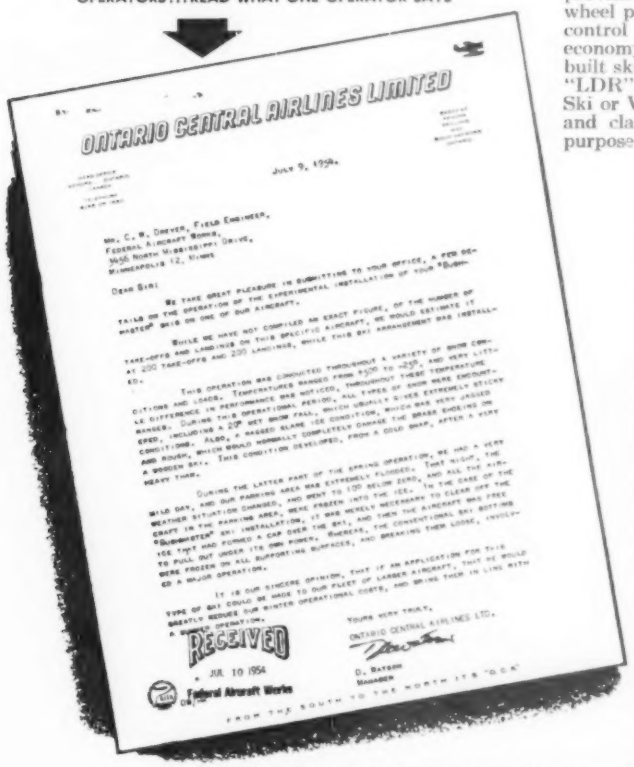
NEW FEDERAL "LDR" SKI BOTTOMS

insure normal take-off performance under every snow condition



Enjoy the Convenience of Fixed Base Facilities with the Utility for Reaching the Most Remote Areas with Federal Combination Wheel-Skis.

PERFORMANCE PROVED BY CANADIAN BUSH OPERATORS... READ WHAT ONE OPERATOR SAYS



ONTARIO CENTRAL AIRLINES LIMITED

July 9, 1954.

Mr. C. R. Driver, Field Engineer,
Federal Aircraft Works,
3456 North Mississippi Drive,
Minneapolis 12, Minn.

Dear Sir:

We take great pleasure in submitting to your office, a few observations on the operation of the experimental installation of your "Super-Wheel" skis on one of our aircraft.

While we have not compiled an exact figure, of the number of take-offs and landings on this specific aircraft, we would estimate it at 200 take-offs and 200 landings, while this ski arrangement has installed.

This operation has conducted throughout a variety of snow conditions and loads. Temperatures ranged from 5°C to -25°, and very little difference in performance was noticed, all types of snow were encountered, including a 20" wet snow fall, throughout these temperature ranges. During this operational period, all types of snow were extremely sticky conditions. Also, a ragged glare ice condition, which was very jagged and rough, which would normally completely damage the skids, engine on a wooden ski. This condition developed, from a cold snap, after a very heavy thaw.

During the latter part of the spring operation, we had a very mild day, and our parking area was extremely flooded. That night, the weather situation changed, and went to 100 below zero, and all the aircraft in the parking area, were frozen into the ice. In the case of the "Super-Wheel" ski installation, it was merely necessary to clear off the ice that had formed a cap over the ski, and then the aircraft was free to pull out under its own power. Whereas, the conventional ski bottoms were frozen on all supporting surfaces, and breaking them loose, involved a major operation.

It is our sincere opinion, that if an application for this type of ski could be made to our fleet of larger aircraft, that it would greatly reduce our winter operational costs, and bring them in line with our summer operation.

Yours very truly,
ONTARIO CENTRAL AIRLINES LTD.
D. Batson
Manager

RECEIVED
JUL 10 1954
Federal Aircraft Works

FROM THE SOUTH TO THE NORTH IT'S "O.C.A."

Federal skis with new high performance "LDR" bottoms provide uniform snow operations normally associated with wheel performance. Federal Wheel-Skis with pilot selective control give greater utilization, safety, convenience and economy. Now the world's most dependable and ruggedly built ski has even better performance with the new Federal "LDR" ski bottom. There is a Federal Combination Wheel-Ski or Wheel-Replacement Ski model for nearly every type and class of aircraft. Federal Wheel-Skis provide multi-purpose landing gear.

NEW FEDERAL "LDR" SKI BOTTOMS HAVE A PROVEN RECORD OF PERFORMANCE

The most adverse flight conditions encountered are those which challenge Canadian and far north bush operators. Federal "Alcan-Bushmaster" skis with "LDR" bottoms have been proven to have outstanding free sliding take-off and landing characteristics. Under the severe conditions of "sticky snow," "frosty snow," "sand snow" and "slush," "LDR" eliminates "freeze down" and "sticking."

ATTENTION! FEDERAL SKI OWNERS!

Federal "LDR" ski bottom surfaces can be readily installed on your present skis. Modernize with a Federal pre-formed "LDR" Bottom Conversion Kit. Enjoy unexcelled ski performance with greater efficiency, less maintenance and increased economy.

Your nearest Federal distributor will give you complete information about this newest development in aircraft skis. Contact him or write Federal Aircraft for the name of your nearest supplier.

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AIRCRAFT WORKS

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Distributed in the U. S. by leading aircraft parts and supplies distributors from coast to coast

54,000 POUNDS THRUST WITHIN A FRACTION OF A SECOND!

Here's another Aerojet-General JATO tailor-made for a specific task—to get Navy carrier-borne jet bombers into the air quickly, safely, and with full payload.

Tailor-made for the *task*, yes, but mass-produced by Aerojet-General with the same high quality, excellent reliability, and broad operating characteristics proved time and again by over 300,000 rocket powerplants produced by Aerojet-General for the Services.

This new high-thrust, short-duration JATO—designated the 5KS-4500—developed by Aerojet-General in cooperation with the U.S. Navy Bureau of Aeronautics, is one of many different solid-propellant rocket units produced by Aerojet-General to fulfill specific needs.

If you are concerned with missile powerplants or boosters, assisted takeoff or in-flight thrust-augmentation for piloted aircraft, auxiliary power supplies, gas generators, turbine starters, pilot ejection, or any problem that demands *full* power *within a second*, Aerojet-General's rocket power specialists are ready to assist you.

- **Solid- and Liquid-Propellant Rocket Powerplants for Missile and Aircraft Applications**
- **Thrust Reversers**
- **Auxiliary Power Units and Gas Generators**
- **Electronics and Guidance**
- **Ordnance Rockets**
- **Explosive Ordnance and Warheads**
- **Underwater Propulsion Devices**
- **Architect-Engineer Services for Test Facilities**

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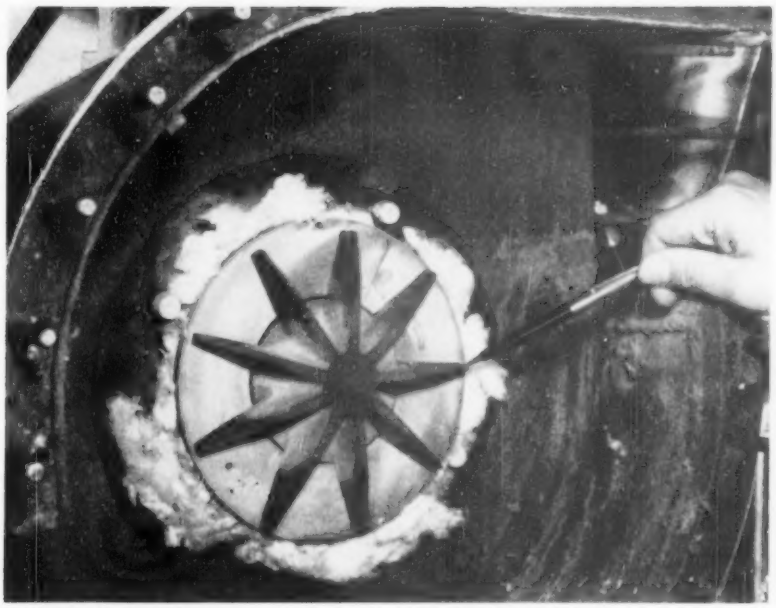
MORE POWER FOR AIR POWER



CLOSEUP OF IMPELLER in gas turbine used to test titanium carbide alloy.

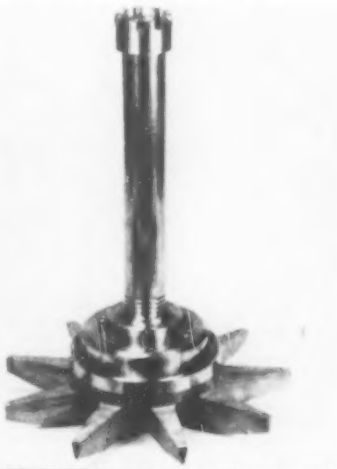
Powdered Metals Take 1,900F

The potential of powdered metals in gas turbine applications has been highlighted by high-temperature experiments with a sintered titanium carbide–Kentanium–at Kennametal, Inc.

A specially designed experimental gas turbine using Kentanium in its critical parts–nozzle, 7-in.-diameter impeller and inner housing–has been operated continuously for 100 hr. at 1,850 to 1,900F at 30,000 rpm.

Engineers found little change in the critical parts, particularly the impeller, Kennametal reports. An efficient turbine with this size impeller operating at 1,800-1,900F would deliver 125 hp. the Latrobe, Pa., company says.

Results of the test with Kentanium have raised the probability that eventually gas turbines will be made to operate at temperatures well in excess of 2,000F, Kennametal reports. Power would be boosted considerably.



TURBINE IMPELLER assembly with Kentanium impeller attached to shaft.

ARDC Contracts

The following contracts have been announced recently by Headquarters, Air Research and Development Command, Baltimore 3, Md.

UNIVERSITY of MISSOURI, Columbia, Mo., research for improving personnel and training procedures for the aircraft observer relevant to bombing and navigation (P.R. 346977), $59,994.

LELAND STANFORD, JR., UNIVERSITY, Stanford, Calif., research and reports on the structure of atomic nuclei and the natures of and relations between fundamental particles (P.R. 22526), $25,000.

TEACHERS COLLEGE, Columbia University, New York 27, research on the teachable elements of problem solving in military settings (P.R. 346984), $49,915; research and reports on investigation of mathematical problems in discriminatory analysis (P.R. No. 290524), $47,300.

UNIVERSITY of PENNSYLVANIA, Philadelphia 4, continuation of studies in photonuclear reactions under contract AF 18 (600)-472 (P.R. No. 226517), $32,000.

BENDIX AVIATION CORP., Research Labs, 4855 Fourth St., Detroit 1, single-axis oscillating table and associated equipment (P.R. 284748), $82,445.

HARVARD COLLEGE, 6 Divinity Ave., Cambridge 38, Mass., research and reports on studies o fat metabolism by use of intraveneous emulsion techniques (P.R. 301605), $48,298.

UNIVERSITY of MICHIGAN, Ann Arbor, Mich., study of war game models (P.R. 369088), $30,000.

UNIVERSITY of TEXAS, Austin, Tex., research and reports on kinetics of elemental processes in flames, combustion and detonation in systems with acetylene and related compounds (P.R. No. 199169), 062,898.

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Don't letter title blocks, specification boxes, symbols, standard components and sub assemblies, standard cross sections . . . in fact, anything that reappears on your drafting board over and over again. Use STANPAT . . . printed on sheets of matte surfaced acetate, backed with a heat resistant adhesive, ready to use in an instant. No special equipment required, just stick 'em down, and there they are.

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A-358 Magnetic *

NEW REMLER AIRCRAFT MICROPHONE . . .

with built-in transistor pre-amplifier

eliminates hissing and . Increases frequency range

from one to three octaves

including important speech overtones. Voice communication be-

tween pilot and control tower is clear as a . Result is

complete understanding in radio, announcing and

interphone applications. Two models or

plug into existing carbon microphone circuits.

* Magnetic types in same housings.

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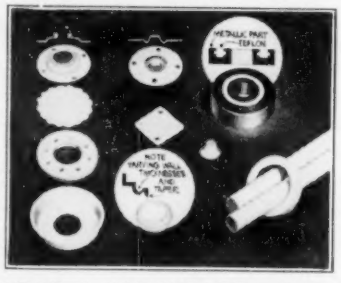
WASHINGTON, D. C.: WYATT BUILDING

GOT A TOUGH ONE IN TEFLON?



CONTACT **SPARTA**, SPECIALISTS IN **TEFLON**
Illustrated are a few of numerous parts and shapes which have been molded, fabricated or otherwise produced of Teflon by Sparta. Represented are Diaphragms, Special Washers, Discs, Seals and Cup Seals showing undercuts and varying wall thicknesses formerly thought impossible to produce in Teflon.

SPECIAL TEFLON SHAPES ARE OUR SPECIALTY

We work with you towards an application-engineered solution to your requirements.

SPARTA MANUFACTURING CO. **EAST SPARTA, OHIO**

'BRAIN' regulates gun's temperature.

New Soldering Units For Production Line

New soldering devices that will provide exact heat necessary quickly for fast, accurate production are being offered by two manufacturers.

▶**Gun Type**—A thermostatic "brain" automatically regulates wattage from maximum to minimum and heats the gun in seconds to the desired temperature at the pull of a trigger. The gun is reported to deliver twice the Btus. that previous types do.

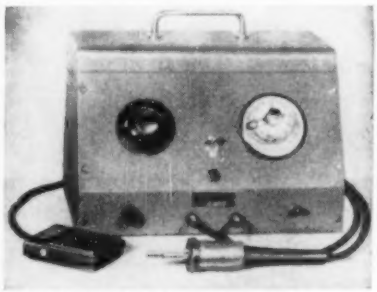
Models 212LT and 214LTN have interchangeable tips and elements. Model 212LT is supplied with ¼-in. tip, has input range from 300 to 650 w.; price is $16.95. Model 214LTN has ¼-in. tip, input of 150 to 400 w.; price is $14.95.

Guns have built-in unobstructed 10-watt spotlight. They are made by Garden City Industries, Inc., 900-910 W. Jackson Boulevard, Chicago 7, Ill.

▶**Resistance Type**—Model 23 resistance-type soldering unit handles printed circuits, germanium diodes, transistors and other precision items. A timer (0-60 sec.) controls duration of heat applied to a split-second. Instant heat is said to be available—up to 1,250F.

By stepping on the footswitch the current will pass into the power unit and start the timer. A toggle switch permits manual operation without the timer. Price of Model 23 is $120.59.

Vermaline Products Co., P. O. Box 222, Hawthorne, N. J.



INSTANT HEAT for printed circuits.

THE PROOF IS IN THE PACKAGES!

Rohr has won fame for becoming the world's largest producer of ready-to-install power packages for airplanes – like the Lockheed Constellation, Douglas DC-7, the all-jet Boeing B-52 and other great military and commercial planes.

This, we believe, is proof of Rohr's engineering skill and production know-how. But it's not the whole story.

Currently, Rohr Aircraftsmen are producing over 25,000 different parts for aircraft of all kinds... many of these calling for highly specialized skill and specially engineered equipment.

Whenever you want aircraft parts better, faster, cheaper – call on Rohr. The proof of engineering skill and production know-how is in the thousands upon thousands of power packages that have made Rohr famous.

WORLD'S LARGEST PRODUCER

OF READY-TO-INSTALL POWER PACKAGES FOR AIRPLANES
–RECIPROCATING, TURBO-PROP, TURBO-COMPOUND AND JET.

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AIRCRAFT CORPORATION

CHULA VISTA AND RIVERSIDE CALIFORNIA

DOUGLAS DISCOVERS OKLAHOMA

a good place to work
a good place to build

new high-speed twin jet Douglas RB-66 recon plane, made in Oklahoma for the U. S. Air Force

Douglas Aircraft Company became a permanent Oklahoma resident in 1951, after two earlier successful experiences here. Why Oklahoma? A good labor supply, primarily . . . stable, qualified people with a desire to work. Douglas' Tulsa plant boasts one of the lowest turnover rates in the country, and absenteeism is no problem. Oklahoma also offers technical training schools, a fair tax structure, and capable small shops for subcontracting. Douglas *likes* Oklahoma and plans to *stay*.

Oklahoma is now one of the nation's leading aviation centers. Consider the advantages of establishing your business in this healthy industrial climate, with expansion room. Write for details.

A STATEMENT FROM DOUGLAS AIRCRAFT'S TULSA DIVISION VICE-PRESIDENT AND GENERAL MANAGER HARRY WOODHEAD:

The great industry and dependability of Oklahoma people has been a most important asset in the fine production records we have achieved.

In addition, the healthy framework of small businesses in the area has enabled us to place more than $37 million worth of sub-contracts in Tulsa, alone, during the past four years.

DOUGLAS

OKLAHOMA
PLANNING AND RESOURCES BOARD
Write – Czar Langston, Director
State Capitol Bldg.
Oklahoma City, Okla.

"THE DOUGLAS-TULSA STORY" IN FULL, HAS BEEN PRODUCED IN BROCHURE FORM. WRITE TO THE OKLAHOMA PLANNING AND RESOURCES BOARD TODAY FOR YOUR FREE COPY!

PRODUCTION BRIEFING

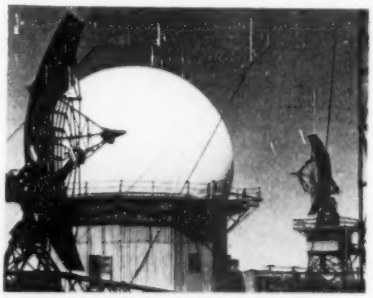
► **Garrett Corp.**, Los Angeles, plans to build $400,000 worth of additions and improvements to its AiResearch plant at Phoenix, Ariz. New space will be used for assembly and overhaul of AiResearch products, a paint department, process laboratory and a new plating shop. Garrett has established permanent Eastern headquarters at 261 Madison Ave., New York.

► **Saving of about $300,000 annually** is expected by Boeing Airplane Co., Seattle, with installation of $340,000 Alodine protective finishing process for nonclad aluminum alloys. Originally an anodic facility was planned for this operation.

► **Continental Aviation & Engineering Corp.** has completed a two-building facility comprising approximately 50,000 sq. ft. to house executive offices, research and experimental facilities and a pilot assembly line for engines. The structures are connected to CAE's other facilities located on Kercheval Ave., Detroit.

► **Rohr Aircraft Corp.**, Chula Vista, Calif., will open a new assembly plant at Windsor, Ga., to handle turboprop power packages for the Lockheed C-130A, being made at Marietta, Ga., which is located about 35 miles away from Rohr's new plant.

► **Avien, Inc.** is new corporate name



Air Defense Radar

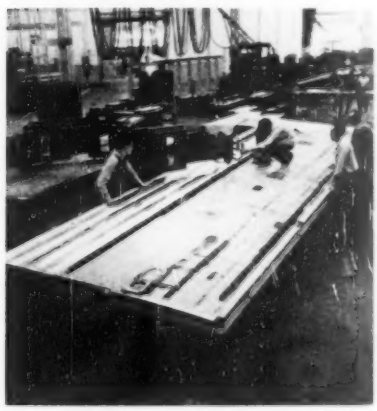
Powerful heightfinder radar, made by General Electric for USAF, is said to have three times the range of previous units of this type (Aviation Week, Oct. 25, p. 7). It is being made in three versions, shown above, left to right: mobile unit, fixed (under balloon radome) for Arctic climates, and fixed unit for temperate climates. Engineers of GE's Heavy Military Electronic Equipment Dept. at Syracuse, and Griffiss AFB at Rome, N. Y., collaborated on the radar. A large quantity has gone into the radar fences guarding North America and for defense posts in nations receiving MDAP aid from the U. S.

for former Avien-Knickerbocker, Inc., Woodside, N. Y., maker of fuel gaging systems and other aircraft instruments. Firm has liquidated its textile activities. Avien is enlarging its technical representation to some 20 personnel during the coming year to cover military air establishments located on three continents.

▶ **Efficient Tool & Die Co.** is building a second plant in Cleveland, expanding its current facilities by 30,000 sq. ft. When plant is complete, the firm will be able to build press tools up to 25 tons in weight compared to present 15-ton capacity.

▶ **Aerodex, Inc.**, Miami, Fla., has delivered 15 completely overhauled North American T-6 trainers to the Dominican Republic. The firm has also fitted complete radio equipment in a B-17 airliner conversion for Rutas Aereas del Peru, Lima.

▶ **Pratt & Whitney Aircraft** has extended Airwork Corp.'s service district for distribution of P&WA spare parts to include New York and the New England states. The added territory will be serviced from a new Airwork branch office in the New York area. The overhaul firm is located at Millville, N. J.

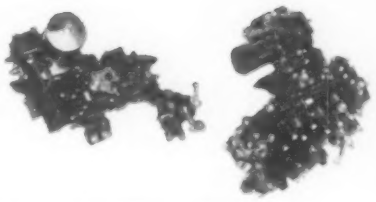


Sheet Tilter

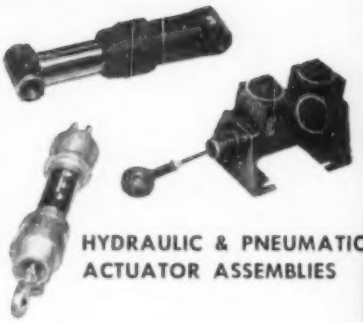
This tilting table, the first of two, has been placed in operation at the Boeing Airplane Co. plant in Seattle, for use with a broken-arm router. With suitable jigs, it is used to hold large curved sheets of aluminum while they are being cut by the router. The tables will tilt in any direction as required to make a cut at right angles to any point on a curved surface. Previously, all curved sheets had to be sprung to a flat position and suitably clamped prior to routing. The tables, costing $9,000 each, eliminate the necessity of springing the sheets, which saves considerable time. They were designed and constructed by personnel employed at Boeing-Seattle.

XLO
EX-CELL-O PRECISION

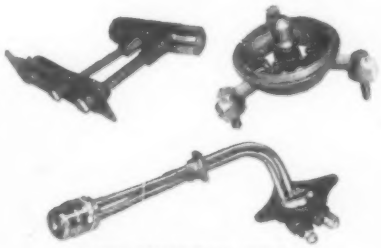
Ex-Cell-O Precision at Production Prices



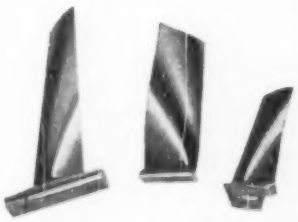
FUEL CONTROL AND METERING ASSEMBLIES



HYDRAULIC & PNEUMATIC ACTUATOR ASSEMBLIES

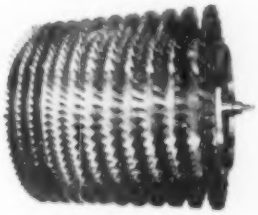


FUEL NOZZLES FOR JET ENGINES



JET ENGINE BLADES

MISCELLANEOUS AIRCRAFT AND COMMERCIAL PRECISION PARTS



JET COMPRESSOR ROTORS

Ex-Cell-O's facilities include laboratory control of materials, design and process engineering, machining of all materials, complete quality control to meet the most rigid specifications, and delivery to meet customers' requirements.

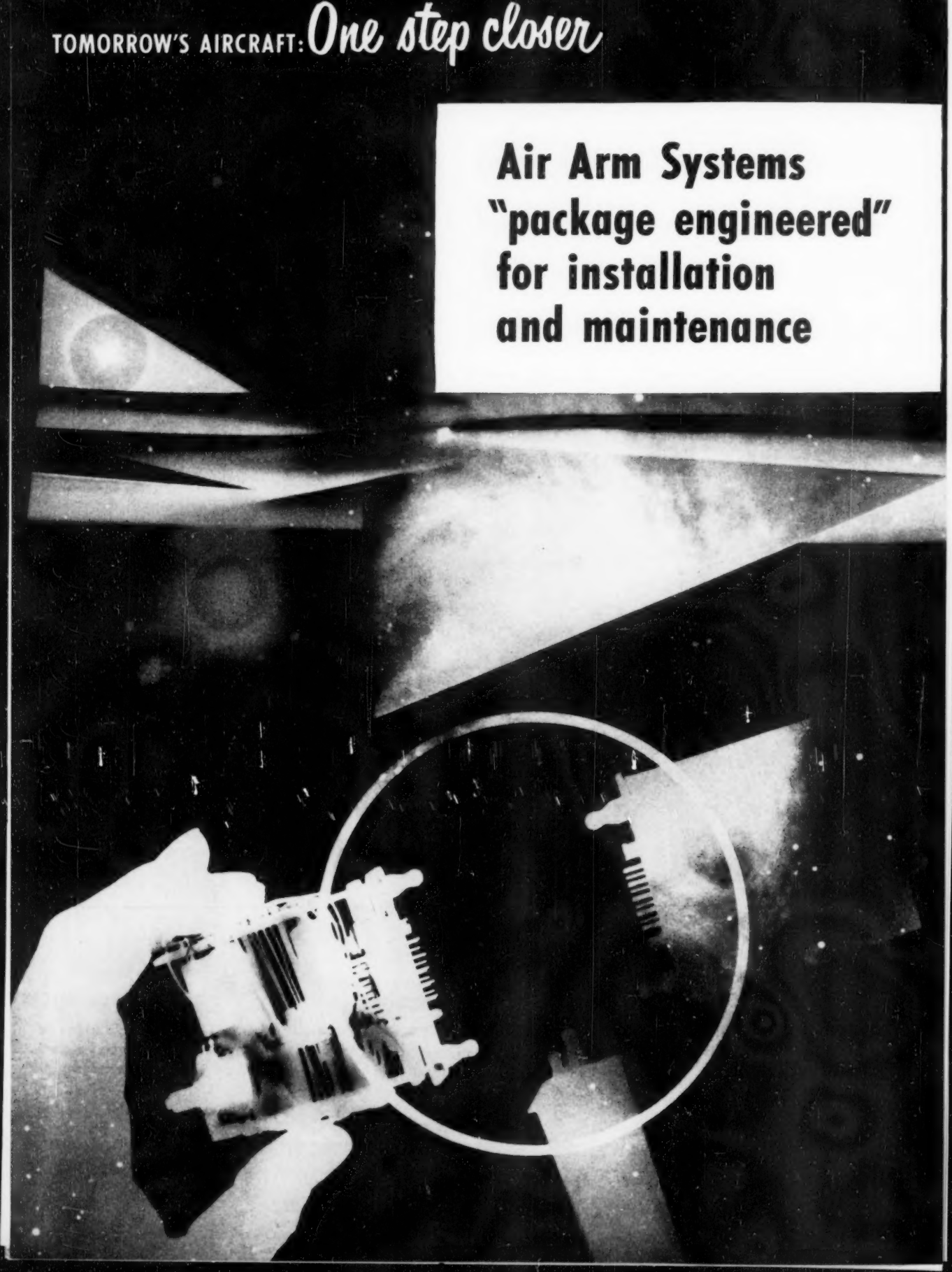
For information or a quotation, write or phone the Precision Products Division of Ex-Cell-O.

EX-CELL-O CORPORATION • DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

TOMORROW'S AIRCRAFT: *One step closer*

Air Arm Systems "package engineered" for installation and maintenance



Quicker installation and easier maintenance . . . important plus-features for airborne electronics equipment are a reality at Air Arm. The basic Air Arm approach to *all* electronic problems, combined with inherent ingenuity and capability, has led to concepts such as pallet packaging, encapsulated and functional circuitry, built-in test points . . . to mention just a few.

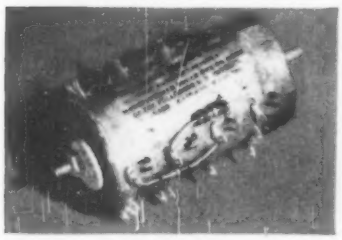
Applying these concepts to all Air Arm systems gives outstanding features . . .

- 100% accessibility
- compatibility with aerodynamic design
- weight and space reduction
- self-contained shock isolation
- simplified airframe design and construction

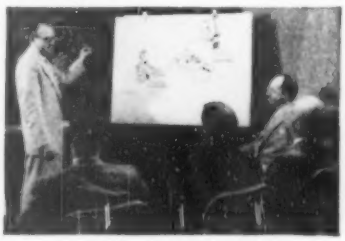
MAGAMPS, potted units and other proven developments for weight and size reduction are a basic part of the new packaging concepts. Electronic circuits are physically combined and integrated into compact subassemblies—each of which has a single major function. Thus, over-all packages are made up of functional units of complete systems.

This "package-engineering" results from intense Air Arm development and close Air Arm association with the special problems of airframe design and operational requirements. Such achievements in electronic-mechanical design are typical of Air Arm's efforts to bring simplicity and increased reliability into airborne systems, thus bringing tomorrow's aircraft—One Step Closer. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-91019



MAGAMPS typify the "package-engineering" which Air Arm applies to airborne systems. Simple and reliable as iron and copper, they are a rugged replacement for vacuum tubes. Wherever such packaging is used, maintenance is reduced, circuitry is simplified and systems are far more dependable.



The most advanced state-of-the-art is always brought to bear in Westinghouse design, evaluation and improvement of airborne systems. For example, human engineering studies help technicians perform tasks quickly, simply and surely—thus building the greatest amount of dependability into the system.

Jet Propulsion • Airborne Electronics • Aircraft Electrical Systems and Motors • Wind Tunnels to Plastics

YOU CAN BE SURE...IF IT'S

Westinghouse

Acceleration!

MEASURE IT
WITH A
GIANNINI
ACCELEROMETER

Magnetically and hydraulically damped units available. High outputs can be used to actuate recording, indicating or telemetering devices directly without amplification. Precious metal potentiometer coil and brushes used for long life and low noise. Unaffected by altitude or humidity. Will operate under conditions of high vibration. *Write for information.*

MODEL
24117P
Small, compact, lightweight. Oil damped, pressurized. Ranges 2.5G to 20G. Resistances 2000 ohms and 5000 ohms.
MODEL
24118
Ranges 1G to 30G. Resistances 1000 ohms to 20,000 ohms. Inert gas filled or oil filled, single or dual outputs, linear or functional.
Giannini

G. M. GIANNINI & CO. INC.
Airborne Instrument Division
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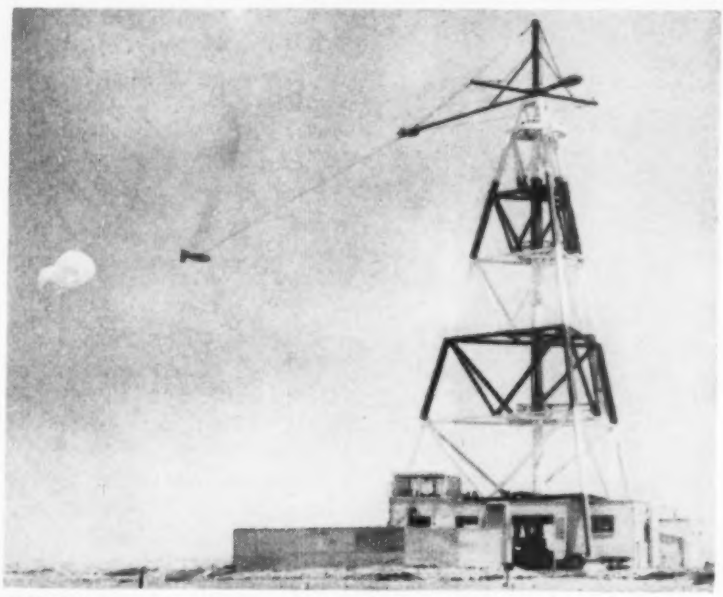


TEST CHUTE is released from gondola whipping around at end of cable.

Chutes Get 500-Mph. Whirl Test

GONDOLA release gear checked before "flight."

Research in design of chutes that will function properly during highspeed bailouts is being accelerated using this 130-ft. whirl-tower at the joint Air Force-Navy Parachute Test Facility, El Centro, Calif.

Here military and industry technicians duplicate stresses found at 500-mph. speeds. Previously two planes were needed—one to drop the chute, the other to photograph the test. This method was inadequate.

General Electric Co. furnished the electrical drive equipment and Radioplane Co., Van Nuys, Calif., has a contract to study the operation.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Adel Div., General Metals Corp., 10777 Van Owen St., Burbank, Calif., pumps, $90,682.

Airheart Products, Inc., 13002 Ventura Blvd., North Hollywood, Calif., cables, automatic brake release units, for SNB-5, -5P aircraft, $31,518.

Bendix Products Div., Bendix Aviation Corp., 401 Bendix Drive, South Bend 20, Ind., couplings, diaphragm, $649,229.

Chicago Aerial Survey Co., 1980 Hawthorne Ave., Melrose Park, Ill., amplifiers, potentiometer assys., $52,186.

Driaire, Inc., 132 S. Main St., South Norwalk, Conn., plugs, 260,015 ea., $28,602.

Flexonics Corp., 1315 South Third Ave., Maywood, Ill., hose and connector assys. for various aircraft, $111,342.

General Development Corp., Box 275, Elkton, Md., envelopes, airship, ZP3K, 527,000-cu. ft. type, maintenance spares support, 1 ea., $173,116.

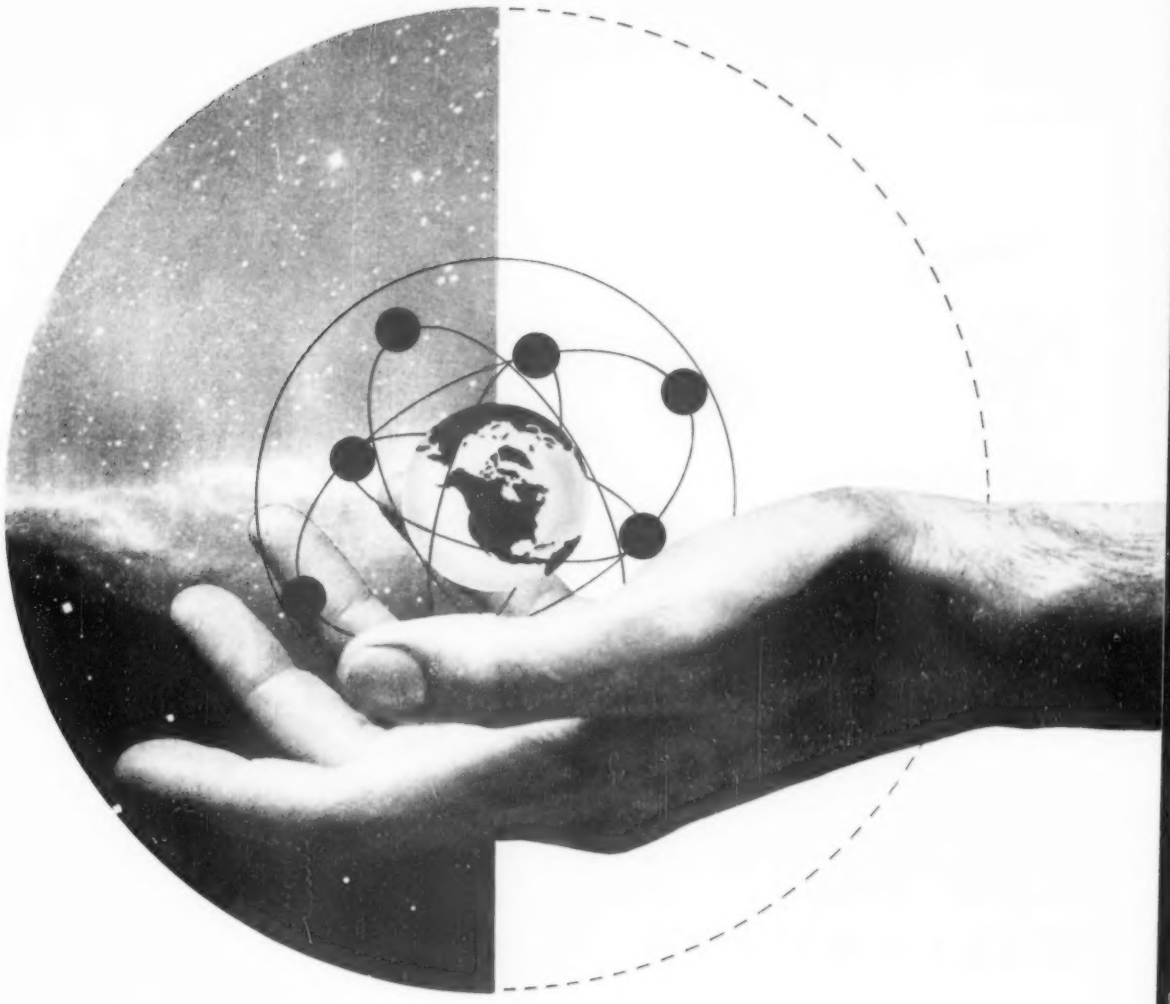
B. F. Goodrich Co., 500 S. Main St., Akron 18, wheel assys., $65,485.

Goodyear Tire and Rubber Co., Inc., 1144 East Market St., Akron, wheel assys., main, for TBM (all) aircraft, 137 ea., $25,690.

Hiller Helicopters, 1350 Willow Road, Palo Alto, Calif., plate assys., $118,503.

Parker Aircraft Co., 5827 W. Century Blvd., Los Angeles 45, maintenance parts, used on fuel valves, various aircraft, $60,017.

Revere Corp. of America, 845 North Colony



brand new world

As a major development in its program of advanced design, Martin has expanded its operations into the field of atomic power.

This means that a top team of scientists, physicists and engineers is now ready at Martin to carry on a strategic long-range program in the application of nuclear energy to weapons systems development.

Yesterday, Martin took the lead in recognizing the importance of electronics, integrating this new science into its operations with engineering and development facilities second to none in the industry.

Today, the horizonless science of nuclear power has been added—again ahead of the calendar.

And tomorrow you can expect Martin to develop techniques for harnessing the potential of each new science to come.

You will hear more about Martin!

MARTIN

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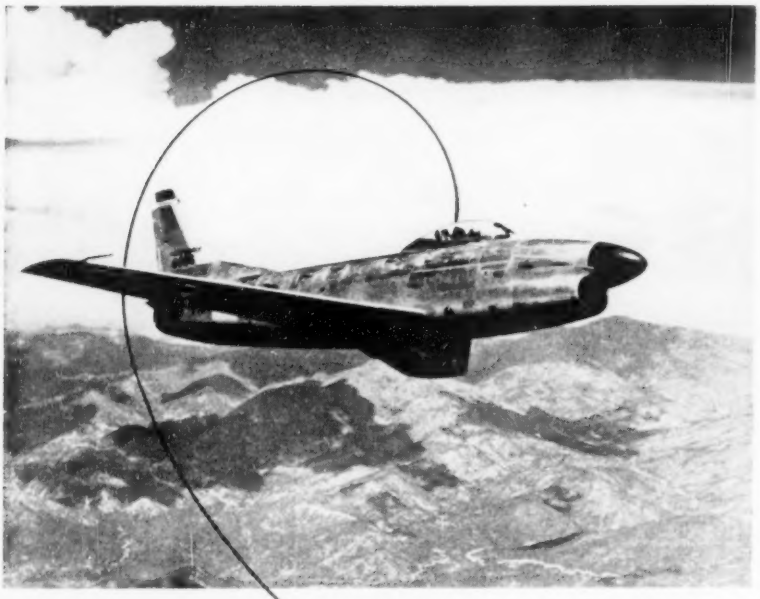

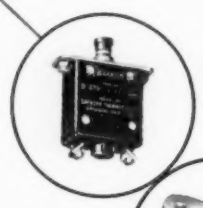

D6751-2
Push-Pull, Trip-Free
Manual Reset
Ratings: 5 to 50 Amps.

PDLM
(Weatherproof)
Manual Reset
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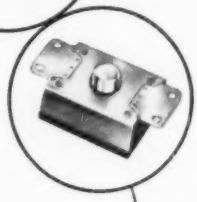

PGM
Manual Reset
Ratings: 105 to 200 Amps.

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KLIXON
AIRCRAFT BREAKERS
protect circuits in famous Sabre Jets

● The all-weather North American F-86D Sabre Jet is the nation's first one-man interceptor designed to protect the country against a sneak air attack.

Among the many parts that make these Sabres deadly in the sky are Klixon Aircraft Circuit Breakers that protect electrical circuits against serious damage from shorts or overloads.

Like the plane, there is nothing delicate about Klixon Circuit Breakers. They withstand shocks and vibration far in excess of the values normally encountered. They are precisely calibrated and individually tested for ultimate trip and 200% load tripping characteristics to assure dependable protection. Write for data giving complete details.

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METALS & CONTROLS CORPORATION
SPENCER THERMOSTAT DIVISION
2811 FOREST ST., ATTLEBORO, MASS.

Rd., Wallingford, Conn., meter for TV-2 aircraft, 128 ea., $29,536.

Scintilla Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., maintenance parts used on magneto assys., $27,814.

Thompson Products Inc., 23555 Euclid Ave., Cleveland 17, fuel pump assys., $54,130.

Vickers, Inc., 14000 Oakman Blvd., Detroit 32, handbooks of overhaul instructions covering A-10695-B PDEN-11-4035/55, $31,643.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., carburetors, 24 ea., $37,038.

Bruning Bros., Inc., 4209 E. Chase St., Baltimore 5, interior paint, $54,984.

Delavan Mfg. Co., 811 Fourth St., West Des Moines, Iowa, engine parts, $49,163.

Douglas Aircraft Co., Inc., 827 Lapham St., El Segundo, Calif., spare parts for use on various aircraft, $38,852.

Douglas Aircraft Co., Inc., 3000 Ocean Park Blvd., Santa Monica, Calif., ground handling equipment, 47 ea., $50,654.

Douglas Aircraft Co., Inc., 3000 Ocean Park Blvd., Santa Monica, Calif., forward crew bunks, galley area windows and berth beams, $167,030.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., maintenance parts for use on various starter assys., $38,437.

Electrical Engr. and Mfg. Corp., 4612 W. Jefferson Blvd., Los Angeles 16, motors, 173 ea., $48,206.

Leland Electric Co., 1501 Webster St., Dayton, Ohio, inverters, 663 ea., $261,505.

Recordak Corp., 444 Madison Ave., New York 22, microfilm readers, 52 ea., $42,005.

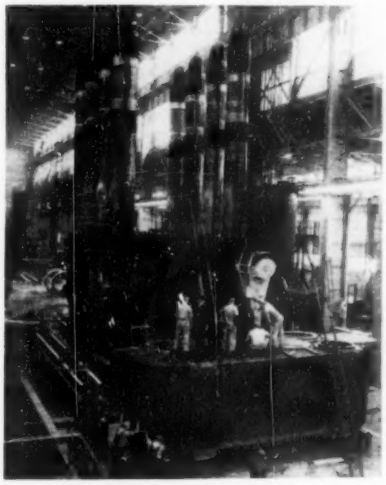
Sherwin-Williams Co., 325 N. Broad St., Philadelphia 7, aircraft enamel, $34,883.

Sprague Engr. and Sales Corp., 1144 W. 135th St., Gardena, Calif., accumulator assys., $75,345.

Texas Instruments, Inc., 6000 Lemmon Ave., Dallas, blowers, 477 ea., $28,143.

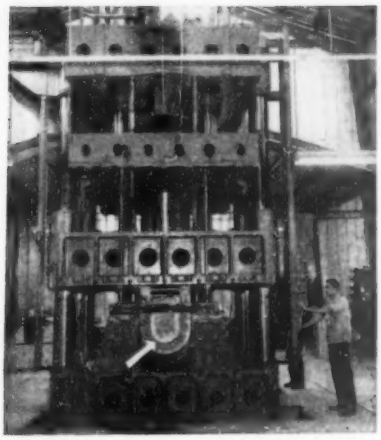
Union Electric and Mfg. Co., 1057 Summit St., Jersey City 7, radar test set and delay line, $187,553.

Carbide and Carbon Chemicals Co., 30 E. 42nd St., New York 17, hydraulic fluid, 34,000 gal., $89,996.



Big Banger

Metalworking giant—50,000-ton forge press built by Mesta Machine Co. under Air Force's Heavy Press Program—is scheduled to go into production next year in the USAF plant at Aluminum Co. of America's Cleveland works, where it is shown being erected. Huge casting being readied for installation is half of the moving crosshead, weighs 460,000 lb. Another forge giant, a 35,000-ton-capacity press built by United Engineering & Foundry Co., will be a production mate for the 50,000-ton machine.



DIE PUNCH, seen from end, is 14 ft. long.

Beech Uses Plastic For Huge Draw Die

A huge plastic draw die has been put to work making production parts for Beech Aircraft Corp., Wichita. Thinking in terms of metal makeup, many tool manufacturers considered construction of such a large die impossible.

The plastic former measures 14 ft. long and is about 4 ft. deep at one end, tapering to about 3 ft. at the other end. It is made up of a fibrous glass-reinforced epoxy resin backed up by a phenolic resin, mounted on a steel frame. Draw rings and die rails are steel, faced with cast epoxy resins.

Both plastics were cured without pressure—the epoxy at room temperature, the phenolic at elevated temperatures.

In the plastic makeup, the punch weighs about 6,000 lb., as against an estimated 30,000 lb. if it were made up from conventional metals.

Tru-Scale, Inc., a Wichita plastics firm, designed, built and assembled the tool for Beech in 60 days. Tru-Scale engineers credited with the design and construction features are Perry H. Pelley and W. M. Page.

Because Beech had no hydraulic press with a bed size big enough to handle the huge plastic unit, it was turned over to Westholt Mfg. Co., Inc., Wichita, for operation. Westholt uses an 800-ton Lake Erie double-action press with a bed size of 13x8 ft.

KC-135 Subcontracts

Boeing Airplane Co., Seattle, has awarded major subcontracts for production of the KC-135 jet tanker-transport, advanced Air Force version of the prototype 707.

The subcontractors: Rohr Aircraft Corp., Riverside, Calif., engine struts and pods and horizontal stabilizer and elevator assemblies, $9 million; Ryan Aeronautic Co., San Diego, aft fuselage

Bendix Red Bank

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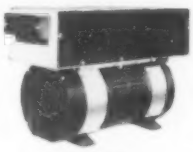
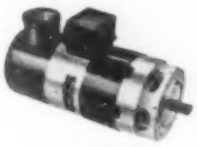


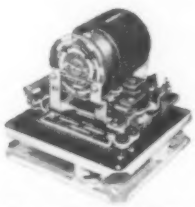
INVERTERS



AC—DC GENERATORS

FRACTIONAL H. P. DC MOTORS

SPECIAL-PURPOSE ELECTRON TUBES



VOLTAGE REGULATORS

DYNAMOTORS

With the transfer of carbon pile voltage regulators and AC and DC generators from the Eclipse-Pioneer Division, Teterboro, N. J., the Red Bank Division of Bendix Aviation Corporation is now in better position than ever to serve the aviation industry's needs. When it comes to special-purpose electron tubes, or electrical power equipment of the types shown above, you can be sure of getting top quality from Bendix Red Bank. Our super-modern facilities and highly experienced technical people are always at your disposal. Call on us any time for recommendations.

Bendix Red Bank DIVISION OF Bendix AVIATION CORPORATION

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West Coast Sales and Service: 117 E. Providencia Ave., Burbank, Calif.
Canadian Distributor: Aviation Electric Ltd., P.O. Box 6102, Montreal, P.Q.
Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

AT LOCKHEED AIRCRAFT CORP., Marietta, Ga., G-E ground power equipment is used to test a B-47, 6-jet bomber. The complete line of G-E equipment assures you of accurate instrument and electrical system tests **plus** faster, more reliable starts.

For all types of aircraft and guided missiles . . .

G-E Ground Power Equipment Gives You Accurate Testing, Servicing . . . Faster Starts

General Electric's complete line of ground power equipment —field proved—assures you of the right auxiliary power for aircraft starting, servicing or testing requirements.

READILY ADAPTED to stationary installations or mobile use, G-E ground power equipment provides:

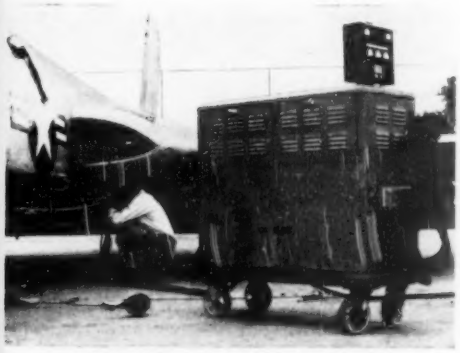
1. Fast, "every-time" starts for jet or reciprocating engines.
2. Ground checking and testing of instruments, devices and guided missiles on flight ramp or in pit installations.
3. Auxiliary power for shop and hangar repair areas.
4. Aircraft factory production testing for any type of aircraft electrical equipment.

ACROSS THE COUNTRY, aircraft manufacturers, airports, the armed forces and ground power equipment manufacturers have installed and applied these dependable, accurate G-E units and components for every auxiliary power use. General Electric has devoted extensive field studies to ground power requirements, and the engineering experience gained through the design of packaged power equipment over the years assures you of getting dependable, low-maintenance performance.

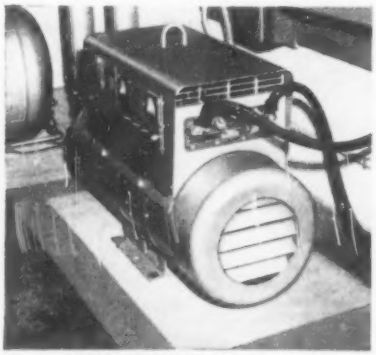
WHATEVER YOUR NEEDS in ground power, General Electric can engineer the right equipment to meet specific conditions of your operating needs and location.

Specify General Electric when you need more reliable and accurate ground power . . . G-E Aviation Specialists are always ready to assist you. For further information, contact your nearest G-E Apparatus Sales Office, or write General Electric Company, Section 821-2, Schenectady 5, N. Y.

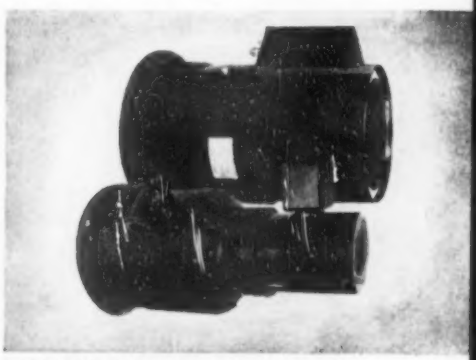
LET G.E. HELP SOLVE *YOUR* GROUND POWER SUPPLY PROBLEMS



FREQUENCY CHANGER PACKAGES are available in 10-, 15-, 30- or 60-KVA ratings for the supply of 400-cycle power. Shown here in ground checking service, this unit is ideal for more accurate instrument and device testing or calibrating.



MOTOR DRIVEN UNITS, like this one in a jet engine test power room, are available in 265-, 500- or 1000-amp, 28-volt ratings. Suitable for mobile use or stationary installations, these units give you accurate and more reliable ground power.



DEPENDABLE COMPONENTS (a-c and d-c generators and motor-generator sets) are available for engine driven, self-propelled or stationary power units. Designed for you, they meet the most stringent government and civilian requirements.

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YOU CAN

Remove and Replace

this self-locking anchor nut

When the removable nut in the NS-109 series is used, installation of anchor base on sub assemblies can be made before chemical cleaning, painting or other surface finishing. Since the threaded locking element can be inserted later, it cannot be damaged or corroded by finishes. The removable nut design also permits easy replacement of the threaded locking element if it should be damaged in service, or if repeated removals make replacement desirable.

NS-109 removable self-locking anchor nut. Meets all envelope dimensions of ANA Standards AN366 and AN362.
WEIGHT: comparable to AN366 and AN362 anchor type nuts.
MEETS: applicable requirements of Spec. AN-N-5 and known requirements of proposed MIL specification on self-locking anchor nuts for torque-out and push-off.
FLOATS: approximately .005 for installation alignment.
SIZES: Available in 8-32, 10-32 and ¼-28 thread sizes.

Nutt-Shel

Manufacturers of self locking anchor nuts and special fasteners

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sections and stabilizer torque box structures, $3 million; Twin Coach Co., Aircraft Division, Buffalo, N. Y., vertical fin and rudders (amount not available); Bendix Aviation Corp., South Bend, Ind., main landing gear units (not available); Menasco Manufacturing Co., Burbank, Calif., nose gear assemblies (not available).

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command.

AiResearch Mfg. Co., Los Angeles, actuator assy. valve pumps, 242 ea., $34,291.

Allison Div., General Motors Corp., Dayton, propeller assys., 120 ea., regulator assys., 300 ea., blade assys., 334 ea., $1,587,972.

American Optical Co., Southbridge, Mass., lenses, 20 ea., $89,650.

Beech Aircraft Corp., Wichita, aircraft, $4,301,492.

Boeing Airplane Co., Seattle, jet tanker aircraft, $25,000,000.

Boeing Airplane Co., Wichita, facilities for prod. of B-52 aircraft, $751,400.

Chicago Aerial Survey Co., Melrose Park, Ill., printer, type EN-6, 6 ea., $69,230.

Continental Motors Corp., Muskegon, Mich., packette engines gear boxes, 458 ea., $2,093,741.

Curtiss-Wright Corp., Metals Processing Div., Buffalo, N. Y., airframe extrusion comp., $500,000.

Donaldson Mfg. Co., Kansas City, Kan., processing mach., photo, spare parts, 32 ea., $193,388.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., beam guidance contr. sys., 1 ea., 1 ea., 3 ea., $146,055.

Thomas A. Edison Inc., W. Orange, N. J., temperature bulbs, 42,203 ea., $238,024.

General Mills Inc., Mechanical Div., Minneapolis, facilities for production of Y-4 bombsights, $93,000.

Goodyear Tire and Rubber Co., Akron 16, wheel assys., 110 ea., brake assys., 110 ea., $52,422.

Graflex, Inc., Rochester, N. Y., camera sets KS 4A(1), 800 ea., $205,320.

Guardian Electric Manufacturing Co., Chicago, switch assy., 4,361 ea., control stick, 2,095 ea., $250,187.

Hallicrafters Co., Chicago, radar sets, 661 ea., $1,766,620.

Houston, Fearless Corp., Los Angeles, EH-11 processor, 4 ea., EN-5 printer, 3 ea., $80,475.

Lear Inc., Grand Rapids, Mich., MB-2 autopilot sys., 258 ea., $3,001,682.

Lockheed Aircraft Corp., Burbank, Calif., F-104 aircraft, $11,000,000.

Lycoming Div., Avco Mfg. Corp., Stratford, Conn., R1820-84 engines, $4,389,980.

Morse Instrument Co., Hudson, Ohio, rectifier, printer projector, 15 ea., $183,440; processing machine, photofilm, 51 ea., $401,255.

Henry Pratt Co., Chicago, exhausts, side throttle, valves, $448,863.

Radioplane Co., Van Nuys, Calif., model OQ-19D targets, 1,990 ea., model OQ-19B targets, 5,382 ea.

U. S. Gauge Div., American Machine and Metals, Inc., Sellersville, Pa., indicator, pressure, 228 ea., transmitter, oil pressure, 329 ea., transmitter, fuel pressure, 334 ea., $47,049.

Westinghouse Electric Corp., Dayton, panels, contr., generator, 38 ea., $29,578.

Wright Aero Div., Curtiss-Wright Corp., Wood-Ridge, N. J., R3350-34 engines $6,452,580.

Zenith Optical Div., Polan Industries, Inc., Huntington, W. Va., lenses, 400 ea., $159,552.

Aerosonic Inst. Co., Cincinnati 2, pressure altimeter, 723 ea., $92,768.

Aircraftsman Co., Los Angeles, bomb racks, aircraft, 4,103 ea., $189,625.

Burroughs Corp., Detroit, celestial computers, 10 ea., $71,969.

OVERSEAS SPOTLIGHT

Aviateca Seeks U. S. Route

GUATEMALA CITY

The new government of Guatemala is making a renewed effort to obtain approval of the U. S. Civil Aeronautics Board on its long-standing application for rights for Aviateca, the government-owned airline, to provide scheduled passenger and freight flights between Guatemala City and New Orleans and other U. S. border points.

At present, Pan American and the Salvadorean flag line, Taca, fly the only scheduled service between the two cities. Lt. Col. Rodolfo Mendoza, Aviateca's new president, made a trip to Washington to push the matter personally. He points out that Guatemala is about to open extensive campaigns to attract U. S. tourists, and expects the anticipated business will warrant three carriers.

Aviateca, which now flies DC-3s only, plans to buy at least one DC-4 for the proposed route.

Reds Get Out of Bulgaria

VIENNA

The Soviet Union has agreed to sell its share of the Soviet-Bulgarian airline, Tabso, in accordance with a general agreement whereby the Soviets are pulling out of direct partnership with Bulgarian state enterprises. Russia had already taken similar steps with regard to the Hungarian airline, Maszovlet (AVIATION WEEK Nov. 15, p. 24).

Tabso, established in 1949, is said to have a well-organized domestic net and one international line, connecting Sofia, Budapest and Prague. Tabso is making plans to start service to Berlin, Rome and West European capitals in the near future.

New Terminal in Siberia

Russia is continuing to build air terminal facilities at what the Communist government says is a record pace.

The official government newspaper, Izvestia, has announced completion of a new airport building at Krasnoyarsk, major administrative and transportation point in central Siberia. The Krasnoyarsk terminal is the third to be opened this year along Russia's important transcontinental route from Moscow to Vladivostok.

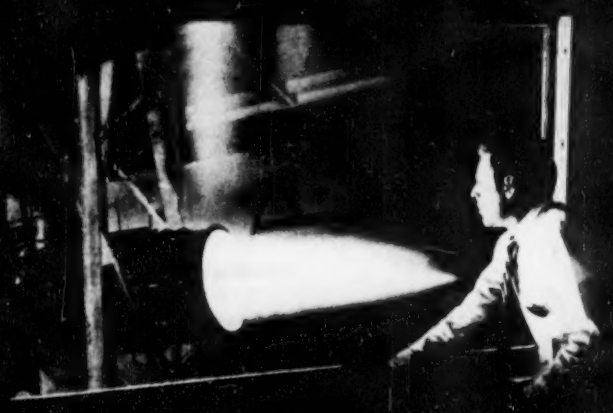
Sweden Opens Big Airport

STOCKHOLM

The first runway at new Halmsjo airport—7,600 ft. long and 200 ft. wide—has been opened here. The concrete

"workhorse"
OF THE AIR
Lockheed C-130
TURBO-PROP TRANSPORT
Maneuverable as a truck, the Lockheed C-130A speeds military cargo at stratospheric heights. The first military assault transport designed for the U. S. Air Force to use turbo-prop engines, the C-130A can operate from short, emergency landing fields, giving the military air mobility for heavy cargoes of personnel, equipment and supplies.
The C-130A depends on Camloc fasteners for rapid accessibility to vital parts. Released and locked with a simple quarter-turn of a screw driver, Camloc fasteners are unsurpassed wherever access doors and panels are required for purposes of inspection and maintenance.
CAMLOC
FASTENER CORPORATION
22 Spring Valley Road, Paramus, N. J.
WEST COAST OFFICE: 5410 WILSHIRE BLVD., LOS ANGELES, CAL.

How Much *Thrust* In A Sheepskin?



Although the learning and technical "know-how" behind a diploma may provide the initial power for a take-off into the competitive engineering world of today, they can soon be outweighed by the *drag* of uninspiring and routine tasks. The *thrust* of education, even when combined with ambition and ability, will not reach its potential height on the ladder of achievement without the aid of modern testing facilities and "tools of the trade" . . . wind tunnels, electronic computing devices, propulsion, microwave, physical test and research laboratories.

At McDonnell Aircraft, our new propulsion laboratory is just one part of a $20 million facilities program designed to provide engineers and technicians with unlimited opportunities for professional growth and *advancement*.

For engineers who would like to reduce *drag* to a minimum by matching their abilities with our facilities, . . . we welcome the opportunity of discussing our advancement program.

Currently needed are:

Aerodynamicists
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Dynamicists
Stress Engineers
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McDONNELL Aircraft Corporation
Manufacturers of AIRPLANES AND HELICOPTERS • ST. LOUIS 3, MO.

is built to take a single-wheel pressure of 45 tons. The runway may be lengthened to 8,400 ft. later.

For the present, Halmsjo will be used as a reserve and alternative airport for Bromma International Airport, but there are indications that Bromma will be turned over to the city of Stockholm for a housing development or retained by the state as a "downtown" airport.

WHAT'S NEW

Telling the Market

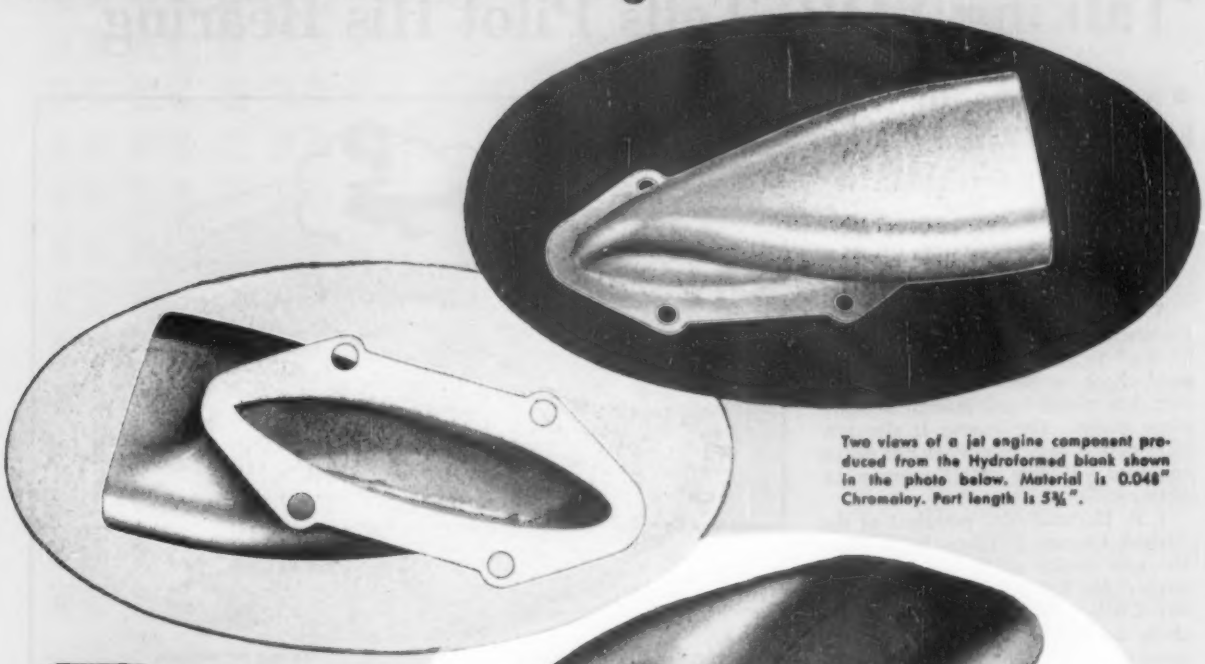
Fans for avionic and other aviation applications are described in 8-page bulletin J-614 about Axivane fans. Write to Joy Mfg. Co., Oliver Building, Pittsburgh 22 . . . . Twigg Industries, Inc., has published brochure listing company's machine tools and other equipment for **precision fabrication and machining of stainless steel, titanium, aluminum** and other metals. Address: Brazil, Ind. . . . New 20-page brochure, entitled **Pumps, the Lear-Romec Story,** describes the division's background and facilities. Address: Lear-Romec, Elyria, Ohio . . . **Specialized tools for Ham Standard reversing props** (Models 34E60 and 43E60) are described in 30-page catalog available from Kell-Strom Tool Co., Inc., Wethersfield, Conn.

Treco Templatooling is name of brochure describing services and facilities of a company specializing in template layout, tool design, etc. A section on plastic tooling is included. Template Reproduction and Engineering Co., 401 N. Broad St., Philadelphia 8 . . . Production Payoff is name of 20-page bulletin on **air-powered screwdrivers.** Ingersoll-Rand, 11 Broadway, New York 4. . . . Four-page Bulletin 301 describes construction and use of **industrial periscopes.** Write Kollmorgen Optical Corp., Northampton, Mass. . . . Advantages of **nylon as a bearing material,** particularly where bearings must operate without oil lubrication, are explained in 8-p. catalog from Thomson Industries, Manhasset, N. Y.

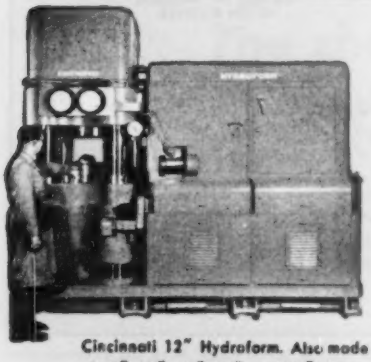
Desk Aids

Complete sets of 68 new tracing **templates of De-Sta-Co toggle clamps** come in any or all of these sizes: full, half, quarter scale. They are available on request to engineers, draftsmen, and engineering or designing organizations. Detroit Stamping Co., 302 Midland Ave., Detroit 3, Mich. . . . Threadwell Tap & Die Co.'s gage selector is handy aid giving specs and dimensions for **ring and plug gages** in fractional or numbered sizes. Address: Greenfield, Mass.

the answer to this tough one . . .



Two views of a jet engine component produced from the Hydroformed blank shown in the photo below. Material is 0.048" Chromaloy. Part length is 5⅛".



Cincinnati 12" Hydroform. Also made in 8", 19", 23", 26", and 32" sizes.

was Hydroforming

The manufacturer who contracted to supply this jet engine component certainly got the job off to a good start. It was well planned throughout. The finished shape was to be obtained by drawing a blank of 0.048" Chromaloy to the required contours so that by cutting the part lengthwise, a right-hand and left-hand section would be produced. The sections, plus a stamped flange, were to be assembled by welding.

The shape of the punch was accurately developed and draw press tools were made. Then the trouble started. The available equipment would not form a satisfactory part. And time was getting short.

So the manufacturer shipped the punch and material to the nearest Cincinnati 12" Hydroform. The blanks were quickly drawn to shape—and the jet engine builder received the required number of parts on time.

Manufacturers who have invested in Hydroforming have been rapidly repaid in shortened part development time, in greatly reduced tool expense, in the elimination of operations, in part quality improvement. Let a Cincinnati Milling field engineer give you complete details. For a description of the Hydroforming process and specifications of the six machine sizes, write for Bulletin M-1759-3.

CINCINNATI **Hydroform**

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THE CINCINNATI MILLING MACHINE CO.
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'Talking VOR' Tells Pilot His Bearing

• New device could give business aircraft crude navigation information on communication receivers.

By Philip Klass

A new low-cost device which makes omnirange stations into "talking VORs," providing pilots with a rough aural check on their nav-receiver accuracy, has stirred much interest in lightplane circles. The reason: It also provides a crude navigation service to planes equipped with only a VHF communications receiver.

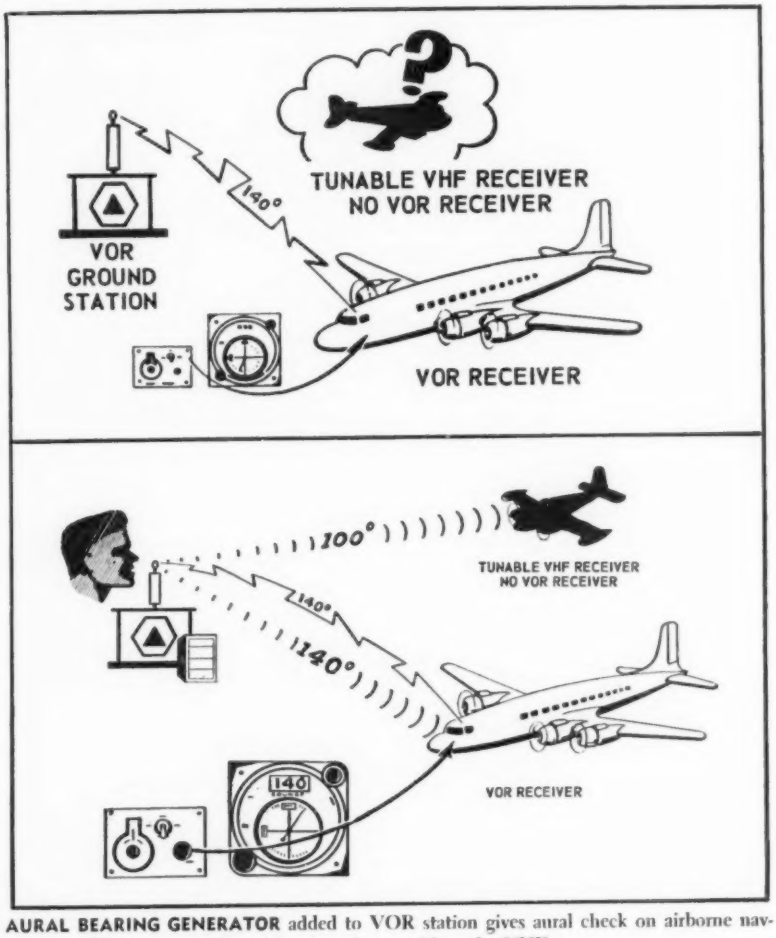
J. B. Hartranft, Jr., president of the Aircraft Owners & Pilots Assn., views the new device as a possible interim nav-aid for lightplane operators when the Civil Aeronautics Administration shuts down the older LF (low frequency) ranges. Hartranft, who flew the visual-aural omnidirectional range (VAOR) during a recent demonstration for industry and press representatives, stated that AOPA intends to make a more detailed evaluation of the device.

The aural bearing generator, which makes VORs into VAORs, was developed by Melpar, a subsidiary of Westinghouse Air Brake Co. Vernon I. Weihe, of Melpar and the Air Transport Assn., originally conceived the idea as a means of providing a rough check on VOR receiver accuracy, rather than as a "poor man's VOR."

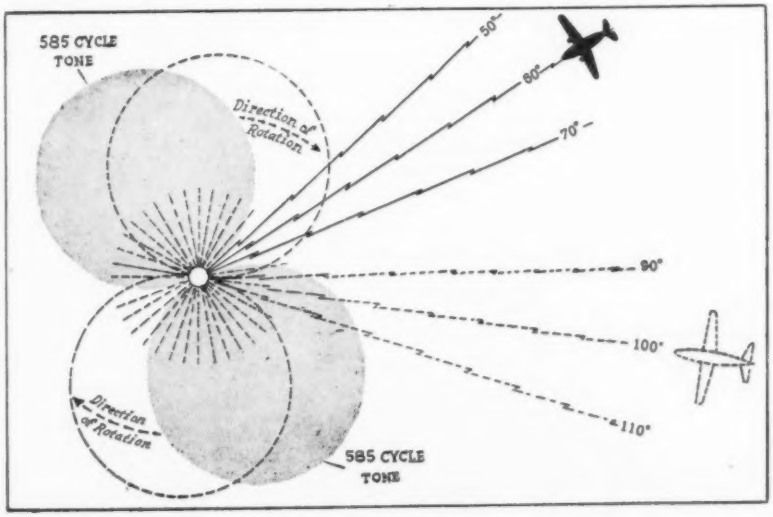
► **Low-Cost Addition**—The aural bearing generator costs about $3,000 (or twice this figure if installed in duplicate). No extra airborne equipment is required.

Westinghouse's Union Switch & Signal Division will make the aural bearing generators.

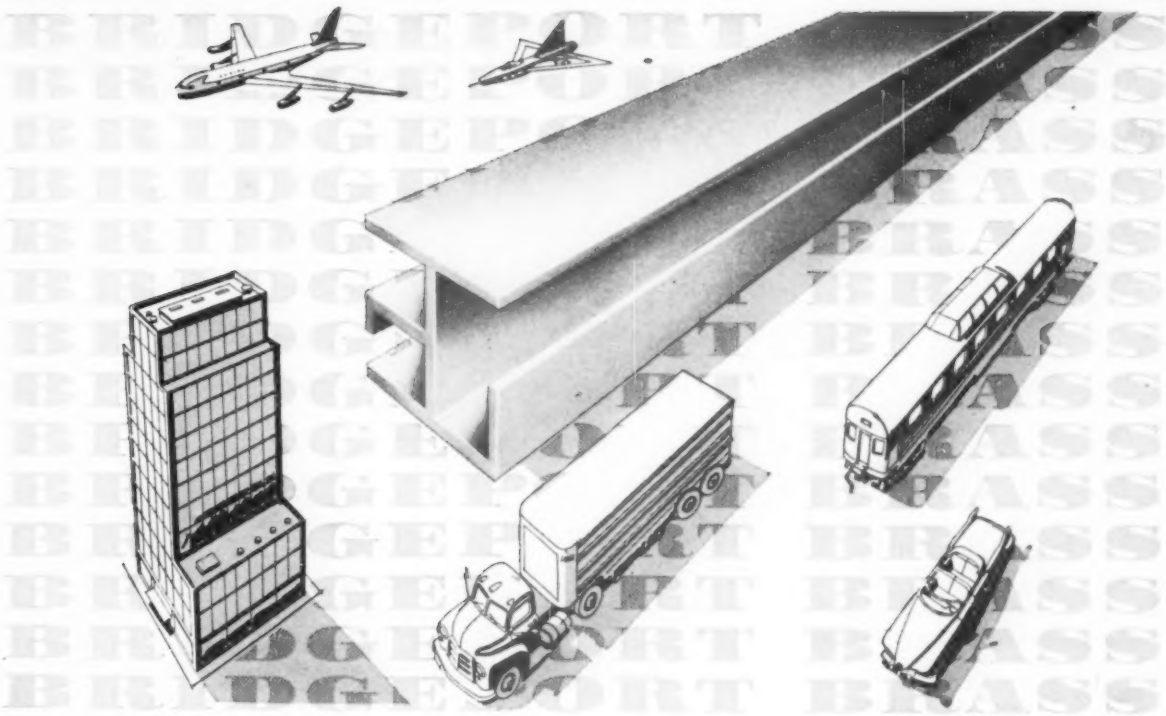
For the recent demonstration to AOPA, CAA representatives, and the press, the ABG was installed in a low-power Wilcox Electric VOR at Dover AFB, Del. Flying the VAOR in a Westinghouse Lodestar, AVIATION WEEK found it relatively easy to de-



AURAL BEARING GENERATOR added to VOR station gives aural check on airborne nav-receiver plus position information to planes with only VHF.



ROTATING 585-cycle tone radiation pattern masks aural bearing count, except during intervals when pilot hears voice giving his plane's bearing or its reciprocal bearing to the station. For instance, the black plane hears voice call out "60 degrees"; a few seconds later, the dotted plane hears voice call out "100 degrees."



The shape of things to come . . .

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And no wonder, for extrusions permit almost endless design possibilities. They're also a real economy potential, since they simplify production and eliminate expensive machining and assembly operations.

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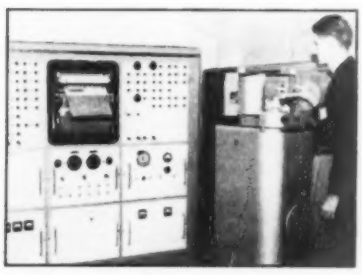
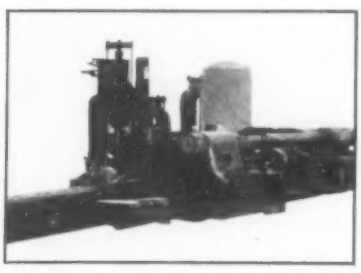


Every production step is subject to strict quality control at Bridgeport Aluminum. This spectroscope detects alloy elements as low as 0.001 per cent.



This extrusion press—one of 16 at Bridgeport Aluminum—has a capacity of 5,500 tons. Any alloy now being extruded can be supplied.

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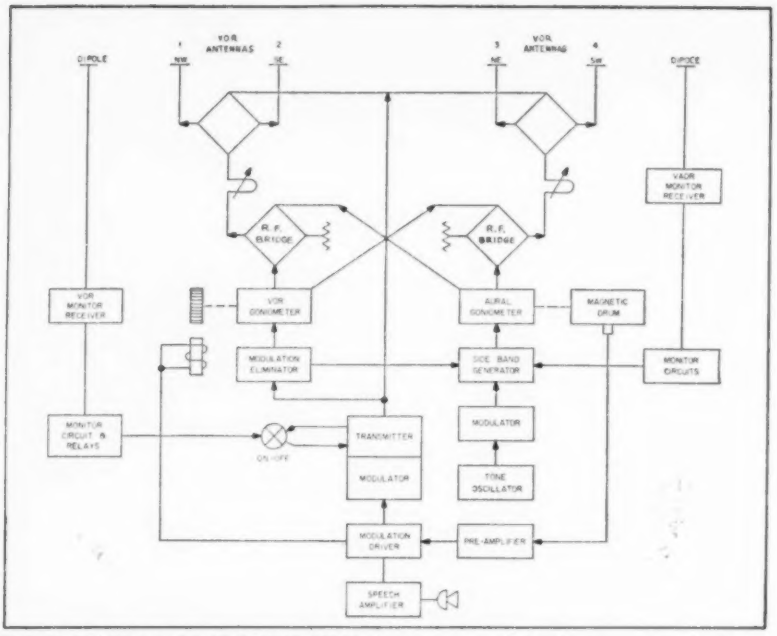


BLOCK DIAGRAM OF 'TALKING VOR' shows how aural bearing generator signals are combined with regular VOR output. Device was developed by Melpar.

termine aircraft bearing aurally to within 10 degrees. With experience, the bearing can be interpolated to 5 degrees, company officials say.

▶ **What the Pilot Hears**—When tuned to the VAOR, the pilot hears a 585-cycle tone and a partially obscured voice (masked by the tone) in the background counting around the compass in 10-degree increments, i.e. "zero degrees . . . 10 degrees . . . 20 degrees . . ." At two points in this count, the 585-cycle tone fades out, leaving only the voice. Then the tone returns to obscure the voice.

If, for example, the pilot's bearing to the station is 90 degrees, the tone will fade out, leaving the voice clear as the count reaches 90 degrees, and again at the reciprocal bearing of 270 degrees. If the VAOR is being used only as a check on the performance of VOR receivers, the visual cockpit indicator resolves this 180-degree ambiguity and tells the pilot the 90-degree heading is correct.

The lightplane pilot, with only a VHF receiver, can determine whether his bearing is 90 or 270 degrees to the station, by turning right or left and noting whether his aural bearing signal increases or decreases. (A similar procedure is common in LF range flying.)

The full 360-degree voice count, including a pause for station identification, and another pause after half the count, requires approximately 90 seconds. Thus the pilot can get an aural bearing every 45 seconds, if he uses the reciprocal bearing count.

▶ **To Ease the Strain**—The aural bearing count provides a reassuring check on airborne nav-receivers, and when used for an occasional check, the 585-cycle tone is not discomforting.

For lightplane owners with sensitive ears and a few extra dollars, Melpar has developed a small (4 x 2 x 3-in.) adapter which automatically squelches the VAOR tone and voice until the 585-cycle signal begins to fade out, at which time it cuts in the voice count. When the tone returns, the adapter automatically suppresses both the voice and tone.

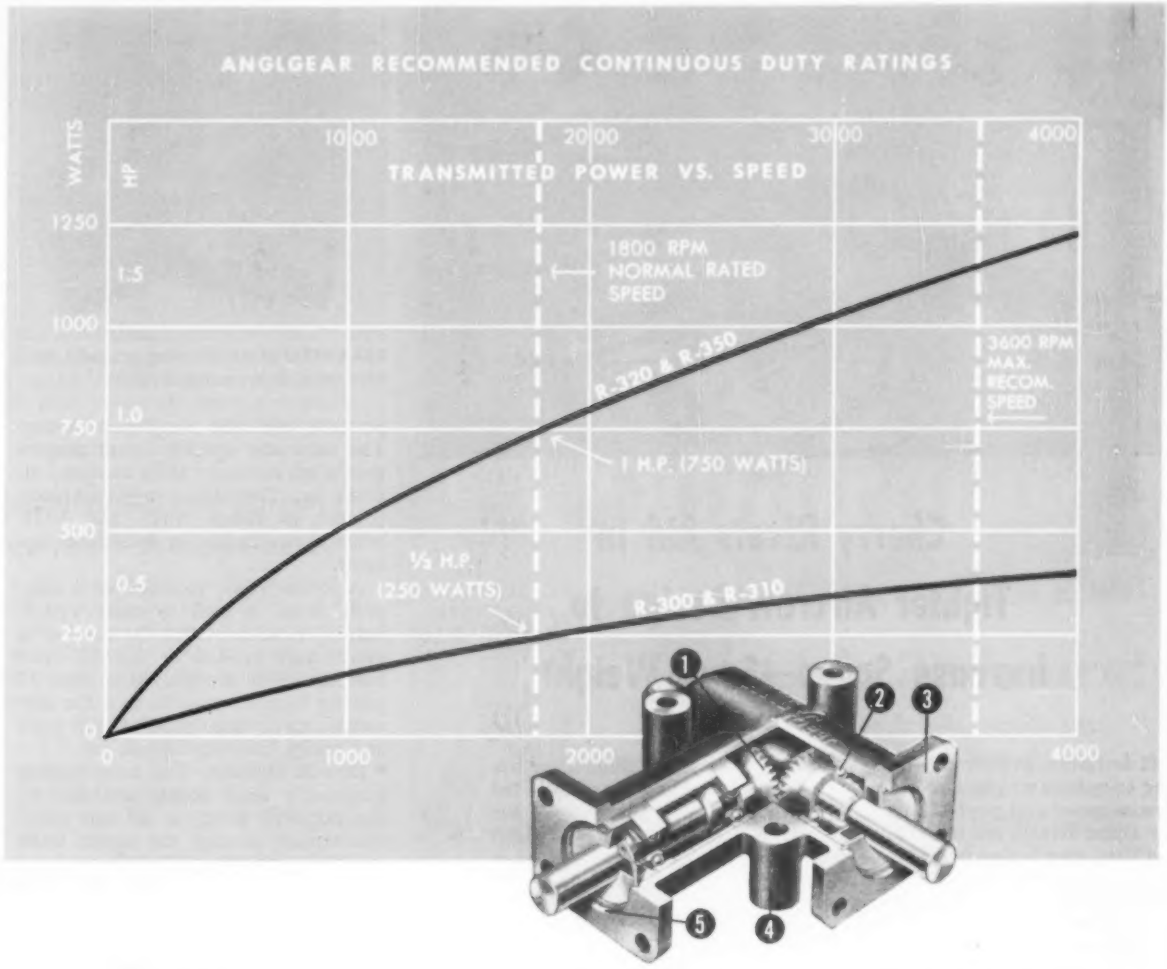
With such an adapter, the pilot hears only the bearing count of his plane's

Swedes Have It Too

Stockholm—A talking radio beacon for air navigation use has been developed by AGA, Swedish electrical manufacturer at Stockholm, and is currently being evaluated by the Swedish Air Force.

Operating in the VHF region, the "talking beacon" enables pilots to establish their bearing to the station within several degrees, using only an airborne communications receiver.

A pilot whose bearing, for example, is 113 degrees, will hear a strong voice repeating "one-zero, one-zero, one-zero" at 12-second intervals. A weaker voice will be heard calling "one-two, one-two, one-two." As the plane approaches a 120-degree bearing, the "one-zero" voice will fade out and the "one-two" voice become stronger. When the plane is on a 120-degree bearing, the "one-zero" voice disappears entirely.



ORIGINAL RIGHT-ANGLE GEAR UPRATED

Now, six years after introduction, ANGLgear stands significantly improved. Static torque rating has been boosted 60%, broadening the field of application. And a fresh set of teeth—the new Coniflex design—has been added to insure smooth, quiet operation, and even longer life. These, however, are the only changes in ANGLgear. The units remain small in size and low in price.

1. Coniflex gears
2. Antifriction bearings
3. Flanged end mountings
4. 3-bolt side mounting
5. Internal pilot on mounting ends
6. 1-1 ratio

Model	Type	H.P.	R.P.M.	Ultimate Static Torque (In lb.)	Shaft Dia. Inches	Wt.
R-300	2 WAY	⅓	1800	400	⅜	½ lb.
R-300x	2 WAY	—	—	500	⅜	½ lb.
R-310	3 WAY	⅓	1800	400	⅜	½ lb.
R-310x	3 WAY	—	—	500	⅜	½ lb.
R-320	2 WAY	1	1800	1500	⅝	2¼ lb.
R-330	3 WAY	1	1800	1500	⅝	2¾ lb.

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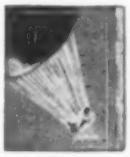

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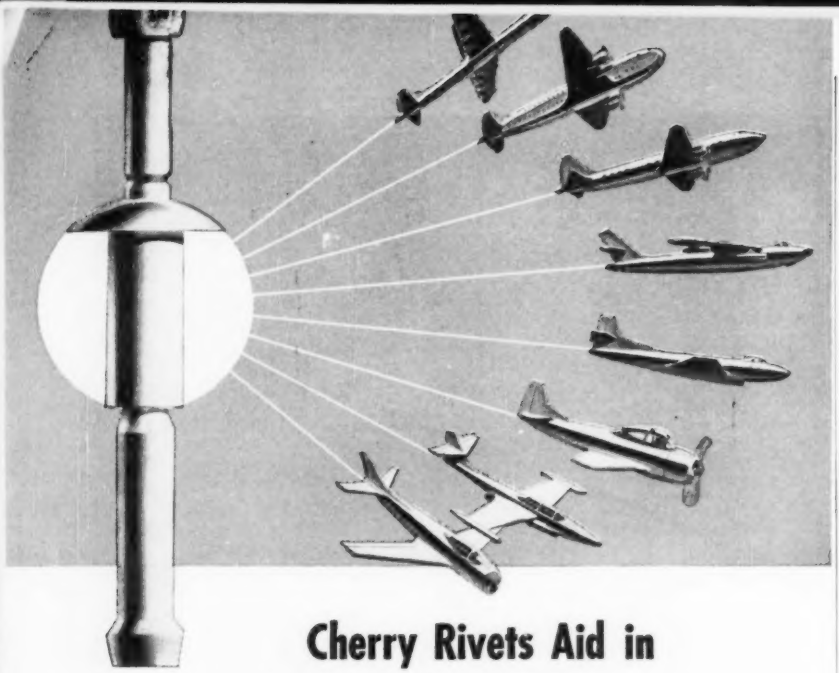

Cherry Rivets Aid in Tighter Aircraft Design to Increase Speed—Save Weight

Aircraft designers, in their constant striving to reduce weight and bulk to increase speed and payload, find Cherry Blind Rivets are more important than ever before in helping to attain these objectives.

Sleek flight forms often owe their clean aerodynamic design to the fact that Cherry Rivets are used in assembling components such as control sections and jet nacelles. Their use also reduces man hours, lowers unit costs.

Tighter, compact equipment is more readily installed in less space—quickly, securely with Cherry Rivets. They are ideal for those hard-to-reach spaces—require no bucking—no hammering—no exploding.

Cherry Rivets make it possible to accomplish fastenings which otherwise would be difficult or impossible because they are installed by one man from one side of the work. A special gun is used which pulls the stem into the hollow shank—upsets the end on the blind side—firmly clinches the rivet in place—fills the hole—all in a split second.

For overhaul and repair, Cherry Rivets provide a fast, safe, secure method of fastening. Their use eliminates the need for removing entire skins to gain access for replacement of damaged sections and parts. Ships are back in the air quicker—maintenance expense reduced.

For information on how Cherry Rivets aid in design, construction and repair of aircraft, ask to have a representative call. He will be glad to help you.

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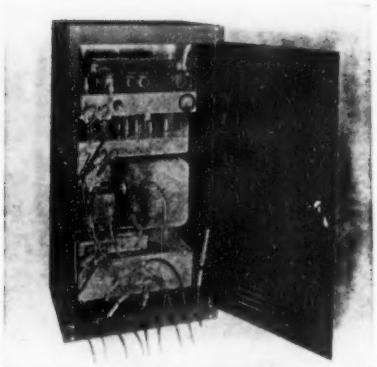
Plants: *New Brighton, Pa.—Chicago, Ill.—Plymouth, Mich.—Santa Ana, Calif.*

In Canada: *Parmenter & Bulloch Manufacturing Company, Ltd., Gananoque, Ontario*



REAR VIEW of aural bearing generator, with door open, shows compact layout.

position, and the reciprocal bearing. The automatic squelch circuit adapter should sell for under $100, company officials say. The adapter might be incorporated in future VHF and VOR receivers as standard or optional equipment.

A female voice, recorded on a magnetic drum, is used to make VAOR bearing announcements because it is more easily masked by the 585-cycle tone than a male voice. More than 75 persons were screened to find the best voice from the standpoint of both pitch and clarity, company officials say.

▶ **How It Operates**—The aural bearing generator's voice count, produced by the magnetic drum, is radiated omnidirectionally through the regular VOR voice channel. The 585-cycle tone, developed in the ABG and fed to its sideband generator, is supplied to its own goniometer to produce a rotating figure-eight radiation pattern which is synchronized with the voice count. When either of the two nulls in the figure-eight pattern (see sketch, p. 58) sweeps by an aircraft, the pilot is able to hear the voice count clearly. At all other times, the 585-cycle tone masks the voice count.

The output from the aural goniometer and the output from the VOR goniometer (which produces the regular rotating VOR signal that gives a visual cockpit indication) are mixed in the ABG's radio-frequency bridge, then fed to the two pairs of VOR antennas (see block diagram, p. 60). Thus, a 585-cycle modulated figure-eight radiation pattern, rotating at $\frac{3}{4}$ rpm., is effectively superimposed upon the regular VOR variable-phase signal, rotating at 30 rps.

▶ **Automatic Monitor**—The ABG includes a monitor which automatically shuts down the aural-bearing portion of the VAOR if its error exceeds prescribed limits. The entire ABG equipment, including monitor, is housed in a cabinet measuring 42 x 21 x 16 in.

Union Switch & Signal officials say the unit has been production-designed

and could be available in quantity in four to six months.

Tests to date suggest that the aural-bearing transmission principle can be applied to more than just the VOR system. One example is a VHF or UHF direction finder which uses a goniometer to create the rotating pattern. The principle may be applicable to the LF four-course ranges also, Westinghouse Air Brake officials say.

▶ **CAA Evaluates**—VAOR has been under test by CAA's Technical Development Evaluation Center at Indianapolis, which is now preparing its final report on the evaluation.

Three CAA representatives who flew the recent VAOR demonstration seemingly were impressed, but non-committal on the equipment's possible future in the federal airways.

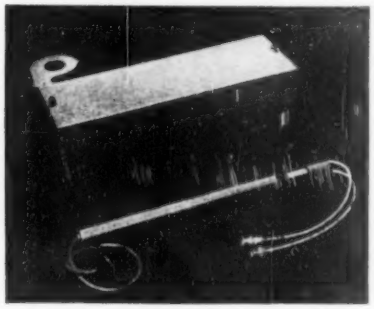
Manufacturers Report New MW Components

A new broadband microwave mixer, which reportedly has a flat response over the entire range of 1 to 10 kmc., is one of several recently disclosed microwave components of interest to avionics designers.

The new mixer, developed by Sylvania Electric, is reportedly the first to cover so broad a band. Unit measures 1 x 1 x 3 in., weighs 8 oz.

Other new microwave components include:

• **S-band traveling wave amplifier tube,** Type HA-2B, capable of delivering 1w. from a 1-mw. input over the 2-to-4-kmc. band without electrical or mechanical tuning has been announced by Huggins



Laboratories, Inc. Tube reportedly has a 30-db. gain and 25-db. noise figure over this band. It requires a 600-gauss field and 1,200-v. regulated power supply. Manufacturer's address: 711 Hamilton Ave., Menlo Park, Calif.

• **Miniature co-axial switch,** with VSWR of 1.3 maximum over frequency range of 0 to 8 kmc., weighing only 4.8 oz., has 50-db. minimum crosstalk, actuating time of 0.005 sec., and operates over a temperature range of −65F to 225F, according to manufacturer. Device has SPDT contacts and a life duration of at least a half

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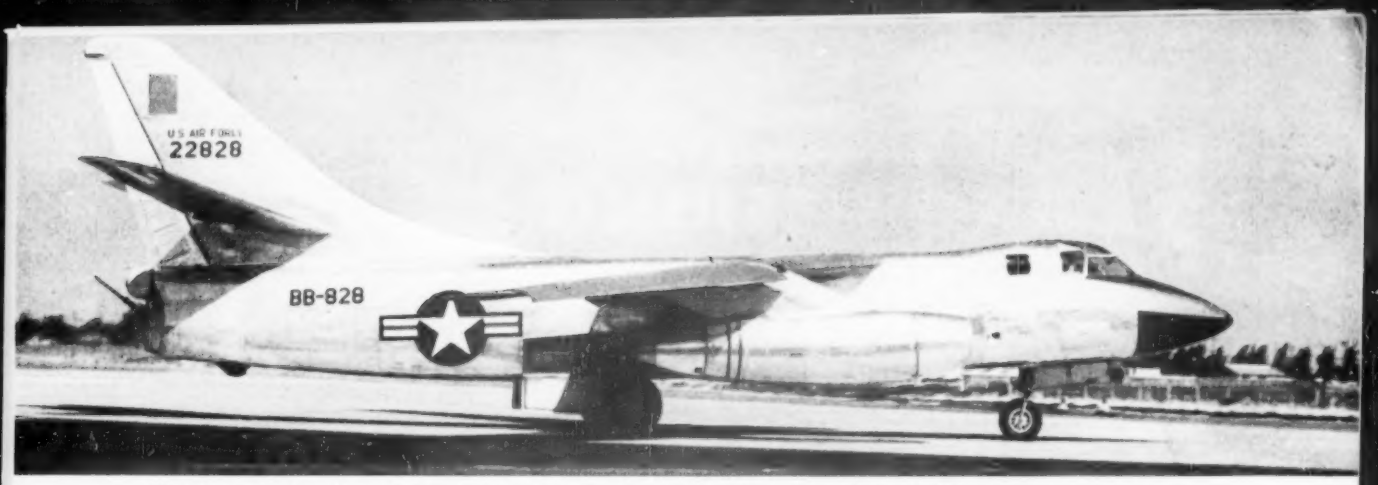
WESTERN AIRLINES

Douglas B-66 takes off at Long Beach, California, for its test run. Its electrical system was designed by G-E application engineers to deliver rated load with 80° C cooling air.

GENERAL ELECTRIC



Side view of bomber shows sleek lines. It is first production aircraft to have an elevated ambient temperature a-c electric system.

Latest Air Force bomber has new G-E engineered power-generating electric system

NEW GENERAL ELECTRIC ENGINEERED SYSTEM MEETS DOUGLAS B-66 OPERATIONAL DEMANDS FOR HIGHER AMBIENT TEMPERATURES

A new a-c electric power-generating system has been developed by General Electric, and is now operating on the Air Force's newest light bomber, the Douglas B-66. The system consists of three major components: high-efficiency alternators, static voltage regulators, and generator control and protective panels.

DESIGNED FOR HIGH PERFORMANCE AIRCRAFT

With a generator that can operate at high ram-air temperatures of high speed flight, the new G-E system is designed for long life and reduced maintenance time. Its static voltage regulator has no moving components to wear out, and under laboratory testing it has withstood 5000 hours of operation without maintenance.

Regulation is preset, and requires no pilot adjustment of voltage or load division. The control panel supplies the automatic control of start-up, shut down, and maximum protection against ground fault, over and under excitation, and open phase.

SPEEDS TAKE-OFF, SPARES PILOT

The new equipment begins operating as soon as the pilot starts the engine. The system contains only two toggle switches, which may remain "on" at all times, even when a fault develops. This eliminates a series of pilot functions and sharply reduces the time required to become airborne. Under normal conditions, fault clearing and resetting are fully automatic.

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General Electric offers a single source for complete a-c or d-c power generating systems and constant speed drives for most aircraft. For more information, contact your nearest G-E aviation specialist, or write Section 210-92, General Electric Company, Schenectady 5, N. Y.

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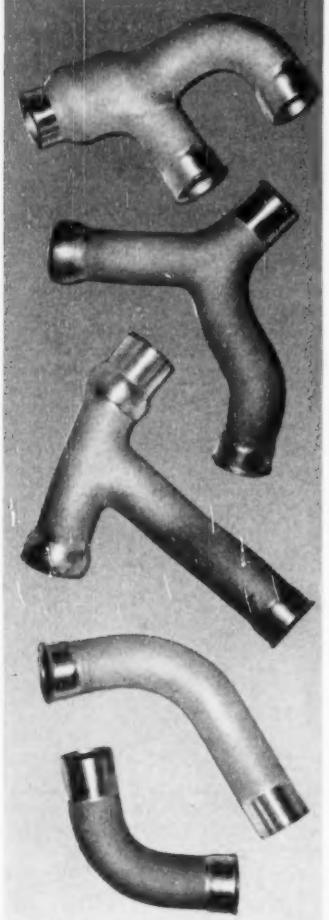
GENERAL ELECTRIC

Static regulator (left) maintains constant alternator output voltage. Control and protective panel (right) helps locate and isolate faulty generation.

New G-E high-efficiency a-c generator has no harmonic over 1%; produces full rating when exposed to high temperatures in high speed aircraft.

Tests of system showed better protection against over voltage, over and under excitation, ground fault, anti-cycling, difference current, and open phase.

1 ENGINEERING
2 DEVELOPMENT
3 PRODUCTION



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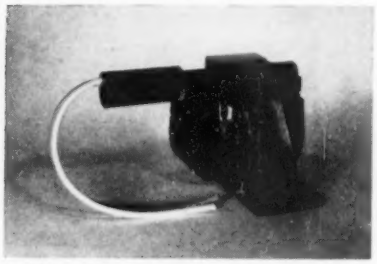
million operations, according to maker, Transco Products, Inc., 12210 Nebraska Ave., Los Angeles 25, Calif.

• **X-band balanced duplexer,** with insertion loss less than 0.6 db., power capacity of 250 kw. (peak), transmit-level VSWR of 1.15, receive-level VSWR of 1.20, covers frequency range of 8.5 to 9.6 kmc. Manufacturer: Airtron, Inc., Dept. A, 1103 West Elizabeth Ave., Linden, N. J.

• **X-band pulse magnetron,** Type GL-6527, designed for reliable operation up to 60,000 ft. without pressurization, is primarily designed for use in airborne radar for gunsights, according



to General Electric. Tube, which weighs 3 lb. is electrically and mechanically interchangeable with the Type 2J42 magnetron. Manufacturer's address: Electronics Park, Syracuse, N. Y.

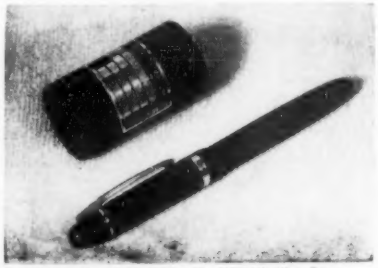
• **Bolometer mount,** Model 157, for measuring relative RF power, particularly on low-duty cycle pulses, is available from Sierra Electronic Corp., 1050 Brittan Ave., San Carlos 2, Calif.

New Subminiature Components Reported

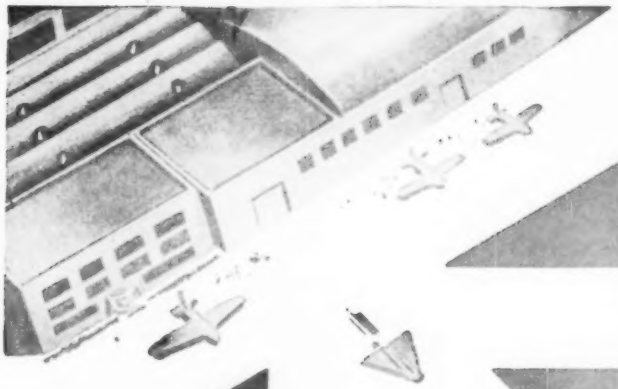
A tiny floated rate gyro, measuring only 1¼ in. dia. by 2¼ in. long, and weighing under 9 oz., is one of several new subminiature components recently announced which will help avionic designers cut equipment size and weight.

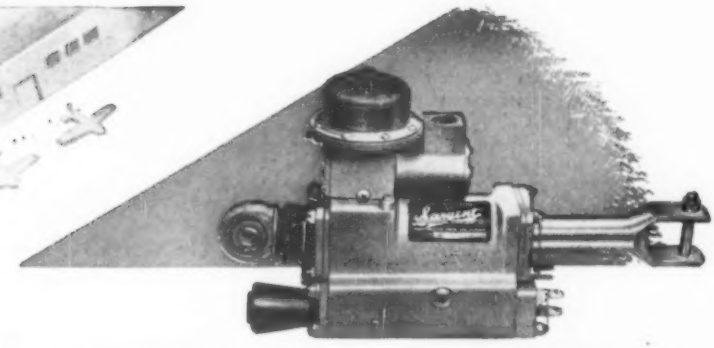
The new gyro is available with either a 26- or 115-v., 400-cps. a.c. or 26-v. d.c. motor, with maximum measuring rates of 20 to 3,500 deg./sec., damping factor of 0.2 to 3.0. Output signal is 12.5 v. into a 10,000 ohm resistive load.

The unit reportedly can withstand 100G shocks and 15G vibration at 2,000 cps. Manufacturer is American



RATE GYRO withstands 100G shocks.

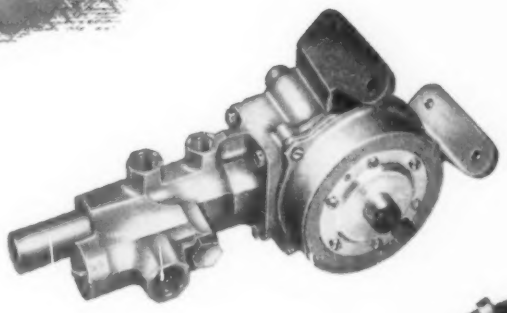




Aircraft hydraulic and mechanical controls by *Sargent*

Sargent has been building *dependable* hydraulic and mechanical controls since 1920. Today, leading builders of military and commercial aircraft recognize Sargent's *undivided responsibility* in research, engineering and manufacture as the standard of excellence for the production of these components.

The story of Sargent's organization, methods, and manufacturing facilities will show you how Sargent can work for you profitably and efficiently. Why not write today for your copy of the Sargent Aircraft Brochure?



SARGENT BUILDS

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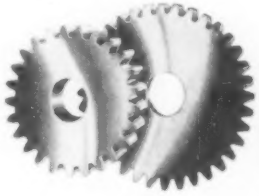

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"Good will" is the disposition of the pleased customer to return to the place where he has been well treated.
—U.S. Supreme Court

Gyro Co., 3030 Nebraska Ave., Santa Monica, Calif.

Other new miniature devices include:

• **Relay,** employing new counterpoise-type construction which reportedly makes unit insensitive to shock and vibration, enables it to meet or exceed MIL-R-5757B. Maximum operating coil voltage is 29 v. d.c., contacts are rated 2 amp. at 28 v. d.c. resistive load. Relay comes in a six-pole, double-throw models, rated for operation between −55C and 85C. Cook Electric Co., Diaphlex Div., 2700 N. Southport Ave., Chicago 14.

• **Printed-circuit connector,** four-contact female model SM4F116, not much bigger than a lead pencil eraser, weighs only 1/40 of an ounce. New connector is designed to mate with 1/16-in. printed circuit or model SM4M116 male connector. Manufacturer is Circon Component Co., 17544 Raymer St., Northbridge, Calif.

Improved 'Tinkertoy' Module Developed

A much-improved "Project Tinkertoy" type electronic module, which uses more stable Mylar-dielectric capacitors and tape resistors, has been developed by ACF Industries' electronics division.

Under J. G. Reid, Jr., and Robert Henry, who directed the original Tinkertoy development at National Bureau of Standards, ACF's electronics division has poured $1¼ million into improving the original NBS design. This includes new methods of encapsulating the modules and of attaching them to printed-circuit boards.

ACF is now tooling up for large-scale production.

FILTER CENTER

► **Avionic Drive-In**—Leach Corp. has outfitted a small truck to demonstrate working models of its new load-sensing engine governor and magnetic voltage regulators which are designed for use in mobile ground-power packages which supply electrical power to aircraft on the ground. Companies, military installations, or airports may get a visit from the truck by writing to 5915 S. Avalon Blvd., Los Angeles 3, Calif.

► **NWA Buys Two Bendix Radars**—Northwest Airlines has purchased two Bendix Radio X-band (RDR-1) radars for operational evaluation, probably on Stratocruisers.

► **Tester Does Good Turn**—New device developed by Infra Electronics Corp. reportedly measures number of turns in a coil winding with an error of no more than 0.5%, regardless of coil resistance, wire size, coil diameter, or temperature, company says. Coil is merely dropped over a probe and a null meter indicates the count. No masters or standards are required. Unit will handle coils with 1 to 1,999 turns, minimum diameter of 0.35 in. Company address is 553 Eagle Rock Ave., Roseland, N. J.

► **Air-Arm Expands**—Westinghouse's Air Arm Division is aggressively seeking to expand its avionics engineering staff by 50%, and will enlarge its Baltimore plant to accommodate the bigger staff.

► **New ADFs Under Development**—Bendix Radio, Collins Radio, Lear, Wilcox Electric, and Canadian Marconi are reportedly developing new lightweight automatic direction finders for commercial-business aircraft. The first three of these companies are working to the Arinc ADF spec, the last two say they will meet some but not all Arinc requirements.

► **Radar Performance Tester**—Airborne Instruments Laboratory has developed a "go, no-go" type device which checks a radar set's power output, receiver sensitivity, and operating frequency to determine whether it is tuned up for optimum performance. —PK

with smaller, lighter parts...

The Walter Kidde 4-D Compressor gives 11¼ pounds of pneumatic power in a space 10" square. This light, small unit is a masterpiece of engineering requiring small components. The Eastern Lubrication Pump has what it takes for this task. A bantam in size and weight . . . a heavyweight in performance.

Eastern has solved many such problems in hydraulics . . . and in pressurization and electronic tube cooling units, too. Inquiries are welcome regarding custom-made equipment to meet your requirements to government specifications.

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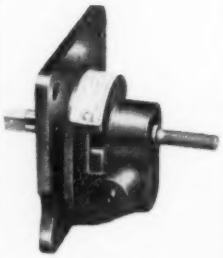

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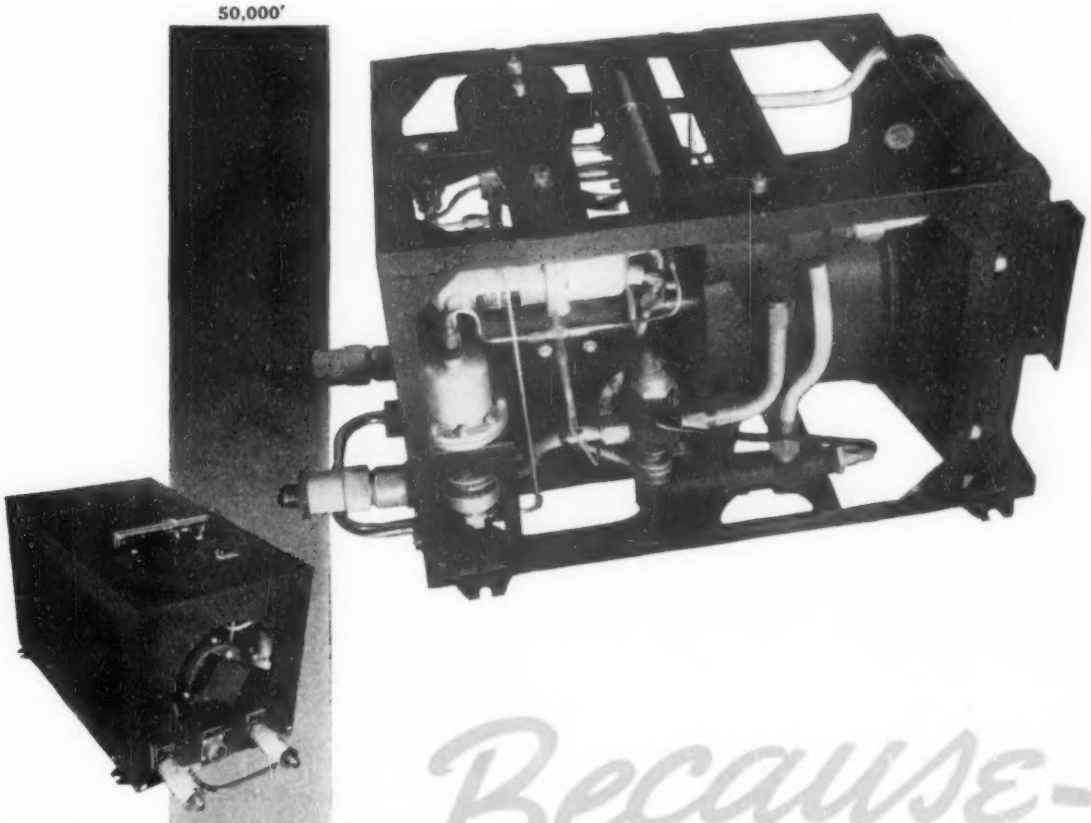
Small enough to hide in one hand! Only 10 ozs.

Why HHD HEAT EXCHANGERS CORES for ELECTRONIC COOLING PACKAGES?



A UAP engineered packaged system containing pump, fan, and high-density heat exchanger with pertinent controls.
Uses ethylene glycol coolant fluid.
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Functions perfectly from sea level to 50,000 ft.

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the UAP high-density plate type heat exchanger core is the most efficient assembly yet developed. *Because* this high-density core permits the use of smaller cooling package components, resulting in greater weight savings and neater installations.

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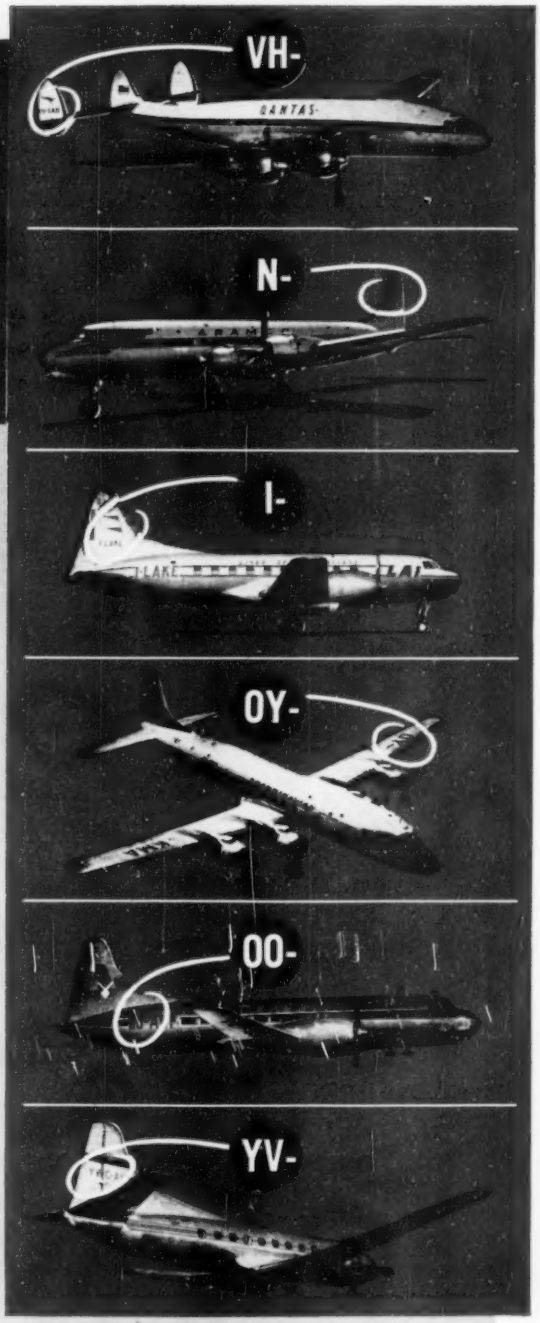

AIRCRAFT NATIONALITY MARKS

Afghanistan	YA
*Argentina	LV
*Australia	VH
Austria	OE
*Belgium	OO
* Belgian Congo	OO
*Bolivia	CP
*Brazil	PP, PT
*Burma	XY, XZ
*Canada	CF
*Ceylon	CY
*Chile	CC
*China (Taipeh Taiwan)	XT
*Colombia	HK
*Cuba	CU
Czechoslovakia	OK
*Denmark	OY
*Dominican Republic	HI
*Ecuador	HC
Egypt	SU
El Salvador	YS
*Ethiopia	ET
*Finland	OH
*France	F
*Greece	SX
Guatemala	TG
Haiti	HH
*Iceland	TF
*India	VT
*Indonesia	PK
Iran	EP
Iraq	YI
Ireland	EI, EJ
*Israel	4X
*Italy	I
*Japan	JA
Jordan	TJ
Lebanon	OD
Liberia	EL
Luxembourg	LX
*Mexico	XA, XB, XC
*Netherlands	PH
* Netherlands Antilles	PJ
* Netherlands Surinam	PZ
* Netherlands New Guinea	JZ
*New Zealand	ZK, ZL, ZM
*Nicaragua	AN
*Norway	LN
*Pakistan	AP
Panama	HP
*Paraguay	ZP
*Peru	OB
*Philippine Republic	PI
Poland	SP
*Portugal	CS, CR
*Saudi Arabia	HZ
*Spain	EC
*Sweden	SE
*Switzerland	HB
Syria	YK
*Thailand	HS
*Turkey	TC
*Union of South Africa	ZS, ZT, ZU
*United Kingdom	G
Colonies and Protectorates	VP, VQ, VR
*United States	N
*Uruguay	CX
*Venezuela	YV

***VICKERS AIRCRAFT HYDRAULICS IN USE**

This table includes all nationality marks that have been formally notified to ICAO up to June 19, 1953. Seventy-five percent of the countries . . . those marked with an asterisk . . . have registered commercial aircraft which use Vickers Hydraulics. Vickers Hydraulic Equipment for aircraft is so widely preferred because it is dependable, efficient, light weight and compact. Ask for new Bulletin A-5200-B.

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We have a new 2½" x 4" plastic wallet card which will give you a permanent record of world civil aircraft registration codes. We'll be glad to send you one . . . write today.

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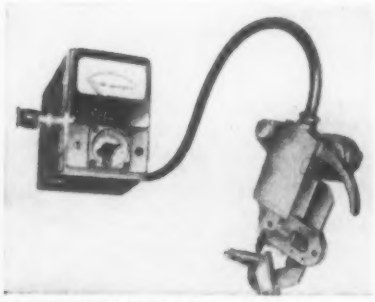
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

NEW AVIATION PRODUCTS

LIGHT BEAM spots tiny deviations.



ELECTRONIC GAGE keeps fine tolerances.

Semi-Skilled Can Use New Gages

To meet the problem of semi-skilled labor having to gage ever-finer tolerances speedily, the makers of micro-measuring devices have recently developed new lines of instruments, including an optical tool capable of spotting deviations as fine as 0.000025-in. on flats up to 20-in. long.

The other instruments include an electronic micrometer capable of measuring as fine as 0.00004-in., a "visible-feel" gage ranging to 0.0001-in., a boregage said to offer major simplification and cost reduction and another cylindrical measuring tool with rapidly interchangeable anvils.

▶**Optical Straightedge**—A light beam, interrupted by the inscribed reticle of a precision "feeler" microscope, is the means by which deviations as small as 0.000025-in. are measured. The prism-and-lens housing rests on two metal blocks over the work and the feeler microscope with its built-in light rides along the surface being examined. Deviations are indicated by the relative positions of two indices and may be converted to linear measurement by referring to a micrometer thimble.

This gage formerly was available only in 5- or 10-ft. lengths. Setting up time is rapid and not elaborate, the maker notes. Particular applications are machine tool tables, surface plates, flatbeds, slideways, cylinders and other flat surfaces.

F. T. Griswold Manufacturing Co., 305 W. Lancaster Ave., Wayne, Pa.

▶**Electronic "Mike"**—A gage for automatically controlling a grinding machine's cycle is guaranteed to maintain tolerances down to 0.00004-in. The Electro-Autosizer is said to make it possible to dispense with air-conditioned gage rooms.

Only about the size of a shoebox, the device is self-compensating for wear and temperature or moisture changes and takes approximately 15 min. to attach to almost any machine. Its capability for handling high-volume production is noted. After it had handled one million items, the last piece was identical with the first within the guaranteed 0.00004-in. tolerance, the company says.

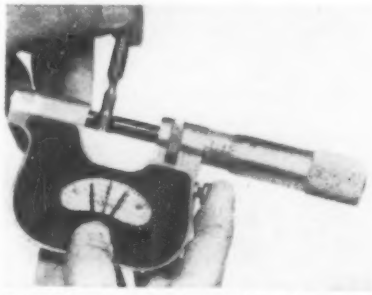
Electronic linearity is maintained over a wide range directly translated from the change in mechanical displacement of the gage feeler as it moves with the changing size of the workpiece.

Separate models of the gage and plug-in components can be obtained for a combination of different phases or steps in production process including grinding and sorting. Interchangeable measuring heads are available.

Electro-Autosizing Machine Div., Industrial Gauges Corp., Englewood, N. J.

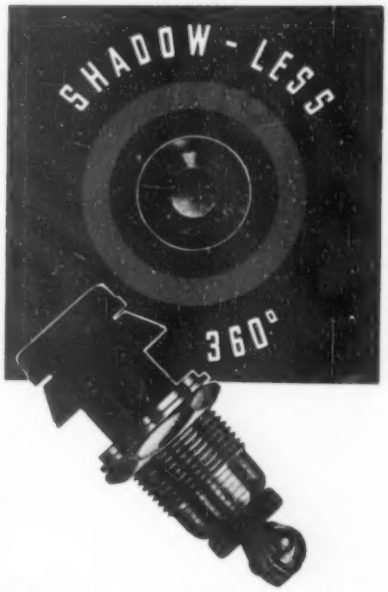
▶**Visible-Feel Gage**—An indicating mechanism which controls measuring pressure so that uncertainties due to differences in individual "feel" are eliminated is the feature of a new micrometer having a range of 0-to-1-in., reading in 0.0001 in.

The Master Compar has a complete set of go and no-go gages of 1-in. range, reading in 0.0001-in. and it can detect out-of-roundness, ovalness and taper. Placing the release button for the re-



INDICATOR replaces "feel" in micrometer.

A New Approach to PANEL LIGHTING



We are now manufacturing an absolutely shadowless edge-lighting fixture, used in edge-lighted panels, to illuminate the faces of back-mounted instruments. These fixtures conform to MS-25010 and MIL 7806. Part numbers 1900 with solder terminal and 1950 with screw terminal.

We Also Manufacture:

- **CABIN LIGHTS - (Adjustable), READING AND COCKPIT FLOODLIGHTS.**
- **CABIN ADJUSTABLE AIR VALVES**
- **ELECTRICALLY HEATED EQUIPMENT.**

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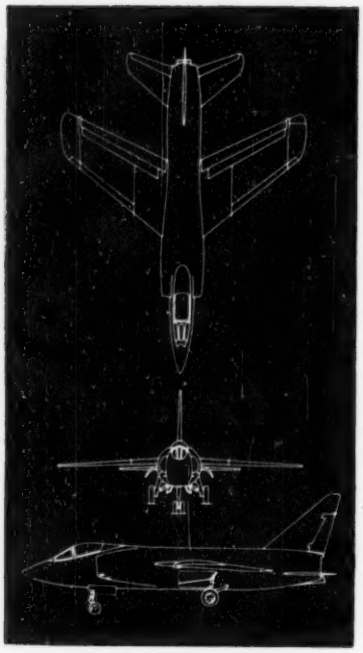

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SUPERSONIC
TIGER

Grumman, one of the most stable aircraft companies in the industry, needs engineers to work on the supersonic Tiger and new Cougar II. With Grumman, your home will be Long Island, the playground of New York. If you are an experienced aircraft engineer, or a recent engineering graduate, send your resume to Engineering Personnel Dept. Interviews at Employment Office.

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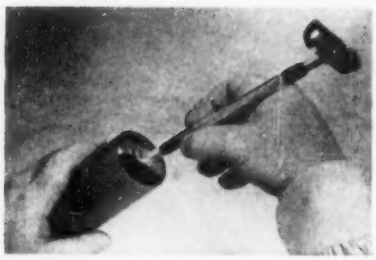


DOUBLE-END BORE GAGE is adjustable.

movable anvil on the right side makes possible normal righthand operation. A screw on the bottom of the housing makes it possible to reset to zero accurately in less than five seconds, the manufacturer reports. Larger sizes, up to 4 in., are furnished with removable indicator. Price for the 1-in. size is $95.

George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y.

► **Adjustable Bore Gage**—Fifteen sizes (from 0.995-in. to 6.005-in.) of adjustable bore gages are available for detecting bellmouth, taper, out-of-round.

Consisting of a light, pencil-size handle connected by adapters to fixed adjustable gages at each end, the double-end tool has removable washers for recording dimensions to which the gages are set.

One gage is go, the other no-go. Each gage has a micrometer-type adjusting screw and a lockscrew passing through a tension nut to provide controlled pressure between the gage components, simplifying setting and locking of gage positively to required size. In use, when a hole is in tolerance, the go gage rocks freely without forcing and the no-go gage binds.

M. C. Hutto Co., 6516 Detroit Ave., Cleveland 2, Ohio.

► **Multi-Anvil Micrometer**—Multi-interchangeable anvils make possible a wide variety of measurements not possible with conventional "mikes," the maker reports. Two anvils are available: a rod about 0.120-in. diameter and a flat type 0.125-in. and 0.060-in. thick at opposite ends. However, additional anvils of various shapes can be made up in the shop and do not have to be hardened for occasional special jobs.

The Mul-T-Anvil micrometer caliper has a range of 1 in. and reads in thousandths of an inch.

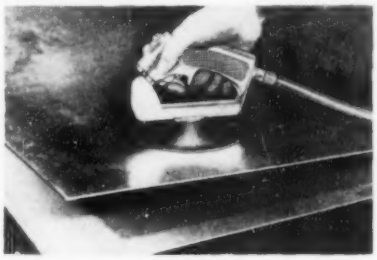
L. S. Starrett Co., Athol, Mass.

NEW MIKE has interchangeable anvils.

Vacuum-Powered Tool Lifts Sheets Safely

Flat sheets of material can be lifted without scratching by applying to the surface the Pres-Vac Lifter, pressing the trigger in the pistol-grip handle, and raising upward.

The lifting power is produced by passing compressed air through a venturi in the tool at 45 psi., creating a vacuum of 22 in. of mercury. The vacuum is conveyed to the 5-in. neoprene cup through passages in the handle.



The Pres-Vac Lifter is supplied with the neoprene cup, aluminum handle, 96-in. hose and pressure regulator, ready to connect to an air-line and use.

F. J. Littell Machine Co., Air Division, 4555 Ravenswood Ave., Chicago 40, Ill.

ALSO ON THE MARKET

Rustripper is designed for alkaline descaling of precision parts where dimensional change and acid embrittlement must be avoided. It also has proved effective in some cases for descaling heat-treated titanium. It may be used in hot or cold solutions; will not attack sound metals; does not require special equipment, such as stainless steel tank; creates no troublesome fumes.—Oakite Products, Inc., 157 Rector St., New York 6.

Nu-d-tergent is organic, non-soap compound suitable for washing airplane surfaces. It works by acid neutralization, wetting out, solubilization, displacement and emulsification.—Kelite Products, Inc., 1250 North Main St., Los Angeles 12.

New mild steel arc welding process operates at greater speeds and lower cost than previous systems. It is claimed to produce a smooth weld that can be painted without cleaning. Key feature of the new process is consumable electrode wire that is made of special mild steel coated with materials that stabilize arc, eliminate spatter and assure good penetration at higher burnoff rates.—Westinghouse Electric Corp., Arc Welding Dept., Buffalo, N. Y.

UNDER ONE ROOF

By James J. Haggerty, Jr.

(No. 6 in a series)

"4 miles of truck highway inside one building speeds Lockheed work in Georgia's GAP-6"

Says James J. Haggerty, Jr., Aviation Staff Writer, Collier's

One step inside the B-1 Building at Government Aircraft Plant No. 6 (GAP-6) and the enormity of its manufacturing area awes you. Here, truly, is the space needed for efficient production of multi-jet aircraft.

Building B-1 is nearly a half-mile long and almost a quarter-mile wide. Its final assembly bay has a 300-foot clear span 45 feet high for the entire 2045-foot length of the building.

This big manufacturing building—largest integrated aircraft plant *under one roof* in the world—has four miles of two-lane truck highway inside the building, providing quick and easy access for material handling to and from all production areas.

GAP-6 is in Marietta, Ga. Since 1951 it has been operated by Lockheed for the U. S. Air Force. The bigness of GAP-6 makes it possible to simultaneously build 92½-ton B-47 jet bombers and C-130A turbo-prop combat cargo airplanes and still have room to build even other big aircraft for our modern Air Force.

Use of these "inside truck highways" to speed the flow and reduce the handling of material is another example of "spaciousness" paying off in efficient, economical operation to effect high quality, on-schedule delivery of big airplanes.

U.S. Air Force
Govt. Aircraft Plant No. 6

Lockheed
Aircraft Corporation
(a Lockheed advertisement)

Georgia
Division, Marietta

PRESENTING THE FIRST PROPELLER-TURBINE AIRLINER

TO GO INTO SERVICE IN NORTH AMERICA...

THE TCA VISCOUNT

Designed by Vickers-Armstrongs
Powered by Rolls-Royce

TCA's introduction of propeller-turbine Viscount aircraft is a major step forward in North American commercial aviation. Already proved by more than 200 million passenger miles on European routes, the Viscount will go into TCA service early in 1955 on U.S.-Canada and Canadian inter-city routes.

The flight of the Vickers-built airliner is characterized by a remarkable lack of vibration and a very low noise level, thus increasing both passenger and crew comfort. Cruising speed: 320 m.p.h. with four Rolls-Royce "Dart", two stage axial flow turbines each developing 1,400 h.p.

Its exceptional economy and ease of operation, together with its established popularity amongst air travellers makes it a notable "double-first" in airline operation on this continent.

TRANS-CANADA AIR LINES

One of The World's Great Airlines

Airlines Renew Nonstop Mexico Fight

- **EAL loses motion to defer hearings pending decision on New Orleans, says this makes action 'unrealistic.'**
- **American and Pan American trade countercharges in round-robin battle developing before CAB examiner.**

By Craig Lewis

A free-swinging battle among Eastern Air Lines, American Airlines and Pan American World Airways for the nonstop New York-Mexico City route is developing in hearings before Civil Aeronautics Board examiner Edward T. Stodola.

Eastern attacked both Pan American and American for allegedly conniving to prevent EAL from getting its New Orleans-Mexico City route, authorized in 1946 but never operated.

▶**Through Service**—Eddie Rickenbacker, Eastern board chairman, called the proceeding "one of the most important cases in the history of Eastern Air Lines' existence."

The case has been set up to decide which U.S. carrier will offer the through service to Mexico, now operated only by Air France. All three competing airlines carry traffic going to Mexico City, but American is the only line that flies all the way—stopping at Dallas. EAL and PAA must use connecting service with other carriers.

Several airlines obtained authorizations to fly to Mexico in 1946, including routes from Texas points for American and from New Orleans for Eastern. At the same time, the State Department was trying to work out a bilateral agreement with Mexico; these negotiations failed, as have subsequent attempts. American made a separate deal with the Mexican government and got its routes operating, but EAL never could get the New Orleans segment into operation.

▶**'Upset Applecart'**—Eastern accuses both American and Pan American of working against its efforts to get service to Mexico City under way. The two also are accused by EAL of negotiating with Mexico during and after 1946 against the wishes of the State Department, and Eastern implies that American's separate dealings with Mexico upset the bilateral applecart.

"American and Pan American studiously and deviously and in many ways made it their special business for the past eight years, since 1946, to see that Eastern did not get what its rightful desserts were under that decision," EAL claims.

"We think that the evidence of the tactics of Pan American and American in obstructing the implementation of Eastern's certificate demonstrates that those carriers are not fit, willing and able to provide the required service and to comply with the law and the Board's regulations."

▶**Funnel Route**—Eastern wants to get the New Orleans-Mexico City route going as well as inaugurating nonstop New York-Washington-Mexico City service. The airline contends that "the granting of this nonstop without regard to the funnel route through New Orleans is to be unrealistic. The two ought to be operated together."

Meanwhile, in a surprise move, American introduced a document signed in 1951 by Rickenbacker and Angel Martin Perez, then chief of Mexico's civil air organization.

The agreement, which Rickenbacker says was just a memorandum, spells out a deal whereby a Mexican airline would serve New Orleans from Mexico City and an American carrier would serve Mexico City from New York, Washington, Atlanta and Birmingham with nonstop rights from each U.S. point. New Orleans was not included in the proposed route.

Eastern's position in the present case is that it should be deferred until the state of the New Orleans certificate is clarified. It says the Board must consider whether existing routes can provide needed service and what effect new routes will have on existing routes—and thus a primary necessity exists to determine exactly what existing service there is.

▶**Witnesses, Documents**—When a motion to get the case deferred failed, Eastern asked subpoenas for several individuals and documents involved in the issue since 1946.

Specifically, subpoenas were requested for:

- **Oswald Ryan**, CAB member and official representative of the U. S. government in the first negotiations with Mexico in 1946.
- **All Board members** and CAB staff members involved directly or indirectly in negotiations since 1946.
- **All present members** of the CAB.
- **State Department** representatives who have participated in Mexican air route negotiations.
- **Various reports**, minutes and documents from the Board, State Department, Justice Department and the White House bearing on negotiations or the status of the New Orleans route.
- **American Airlines'** 30-yr. permit (a copy) obtained from the Mexican government in 1946.

▶**'Equity' Reasons**—EAL hopes such testimony and material will prove that "Eastern has a great equity in the New York-Washington-Mexico City service; that in addition to the traffic which Eastern has carried over the years, Eastern has the direct route between New York and Mexico City; that Eastern has always been very much interested in having that route implemented; that we have cooperated in every possible way to obtain the implementation of that route."

The airline proposes to operate two flights daily on the nonstop route. As soon as Douglas Aircraft Co. delivers EAL's DC-7Bs, a first-class DC-7 flight will be offered and an aircoach with Lockheed Super Constellation equipment. Until the DC-7 is available, both services will use the Super Connie.

EAL also proposes reduced fares for the service. First-class would be $130.45 instead of the current $145.40, and coach $94.15 instead of $99.00.

▶**AA Experience**—American Airlines, which has flown into Mexico since 1942, points to its long experience with the route as a basis for granting AA the nonstop authorization.

Walter H. Johnson, Jr., American vice president-sales, describes the Mexican market as "primarily a personal and vacation market, and therefore its long-range development unquestionably will lie in the coach field."

The airline estimates it has spent $250,000 annually for the past five years promoting Mexico through advertising and other media.

AA plans call for the use of one combination DC-7 flight daily. The airplane would be split into coach and first-class compartments.

▶**PAA Accusation**—During the hearings, a Pan American attorney accused American of selling passengers away from PAA on Mexico-Europe traffic.

He quoted figures for March 1954,

saying that of a potential 112 trans-Atlantic passengers between Mexico and Europe, only 21 crossed on U. S. flag airlines.

American retorted that the figures quote AA to the gateway and "the best possible service in terms of connection and the passenger's requirements on to destination."

► **'Dog Leg' Flight**—Support for EAL's position came from Sen. Russell Long of Louisiana and de Lesseps S. Morrison, mayor of New Orleans. Mayor Morrison said: ". . . For eight and a half years we have sat back and watched everybody that has to go from this populous area to Mexico fly a dog leg."

Edward D. Rapier appeared for the state of Louisiana to ask that the hearing be adjourned until the issue of the New Orleans service is settled.

The state of Georgia took a stronger stand. Attorney General Eugene Cook read a letter from Gov. Herman Talmadge favoring Eastern over PAA and American.

"We believe that our section and the air carrier which for a quarter of a century has served our section should have the implementation of its 1946 Mexican permit before these other carriers are allowed to come in for further indulgence at our expense and disadvantage," said Talmadge.

Capital, ALPA Sign Turboprop Contract

Capital Airlines and the Air Line Pilots Assn. have signed a contract for next year that includes the first contractual provisions for flying turboprop transports.

Capital plans to start operation of the turboprop Viscount early next spring.

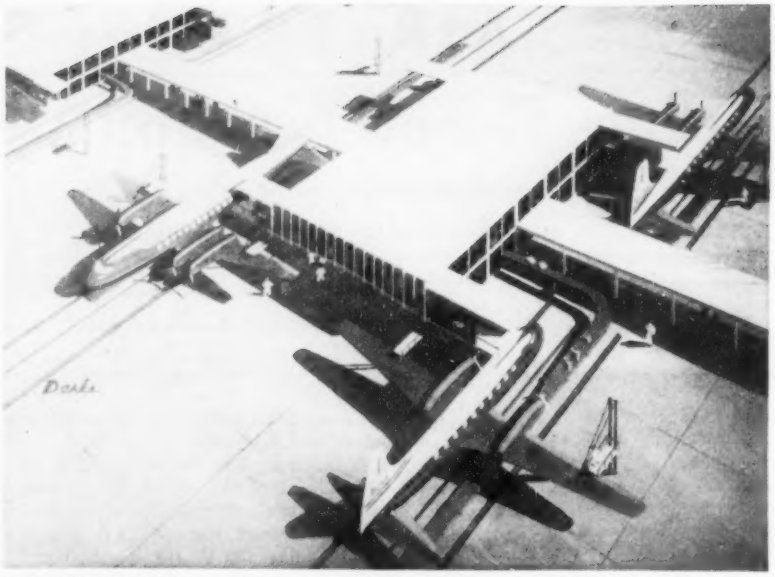
► **Speed Standards**—The contract, to become effective Jan. 1, continues current provisions for Capital's present equipment; this part of the pact is for one year. The agreement relating to the Viscount runs for two years.

Bargaining between Capital and ALPA produced speed standards to be used in the speed-weight formula used in figuring pilots' pay. Viscount speed was set at 300 mph. for hourly pay purposes and 310 mph. for mileage.

► **Surplus Clause**—Severance pay provisions are included to cover the possibility that some pilots might become surplus because of the Viscount.

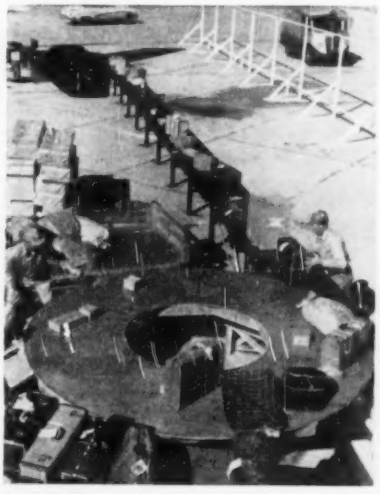
If a pilot should be laid off for more than 60 days due solely to the purchase of the turboprop airliner, he will be paid according to a scale that ranges from four months pay for four years of service to a year's pay for anything over eight years of service.

The severance pay provision is to terminate four years from the date of delivery of the 40th Viscount.

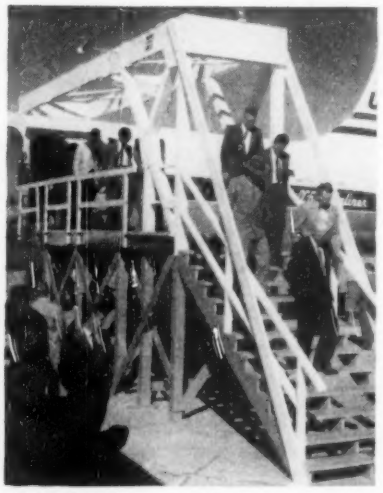


PROPOSED AIRDOCK would have central building for passenger and cargo facilities. Convairs are towed in nose first; DC-6s, DC-6Bs and DC-7s are brought in tail first.

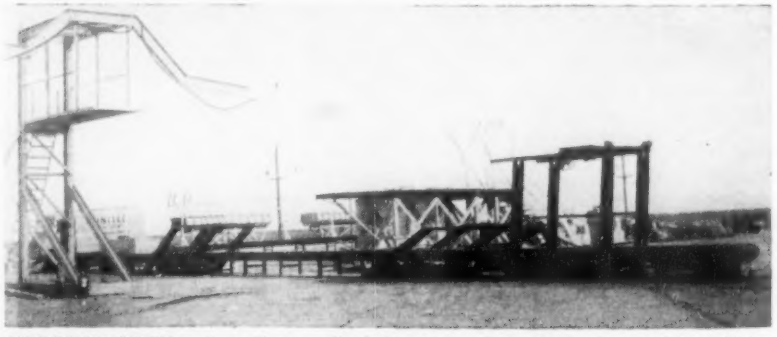
UAL Tests New Dock for Airliners



BAGGAGE movement is tested on working mockup of reversible conveyor at Denver.



PASSENGERS leave airdock mockup, being evaluated at United Air Lines Denver base.



AIRDOCK MOCKUP main sections are the fueling boom (left), eliminating need for vehicles, and the passenger "bridge" (center). Cargo conveyor is under the bridge.

Dallas Rejects Gurney Airport Plan

CAB chairman gets scathing letter challenging his role in suggesting Ft. Worth field be used by both cities.

By Frank Shea, Jr.

The heated Dallas-Ft. Worth airport battle (AVIATION WEEK Nov. 15, p. 29) is fast approaching the boiling point as the result of a recent letter from Civil Aeronautics Board chairman Chan Gurney calling for operation of Ft. Worth International Airport as a joint terminal for the two cities.

Since this idea is in line with Ft. Worth's thinking, the city jumped at the opportunity and immediately dispatched a letter to the mayor of Dallas citing Gurney's letter and offering to sell its rival half interest in the Ft. Worth airport and to change the name to the "Dallas-Ft. Worth Airport, Carter Field."

▶ **Dallas Challenge**—Dallas reacted as expected. In a scathing letter to Gurney, Dallas chamber of commerce president Jerome Crossman made it clear that there would be no such deal as far as his city is concerned. He called Gurney's letter an "amazing document" and challenged the CAB chairman to clarify his role "in this maneuver."

Gurney's letter to Ft. Worth's city manager recommended:

- Consideration of sale of a proper portion of Ft. Worth International Airport to the city of Dallas at the original cost to the city of Ft. Worth.
- Consideration of changing the airport's name to something indicating its "true position of serving both Dallas and Ft. Worth," as well as a number of growing outlying cities.
- Possible formation of a joint port authority administered by a board of directors composed of leading citizens of the two cities. This might take the form of a corporation such as the New York Port Authority or a similar corporate structure.

▶ **'Better Service'**—Gurney said this structure "might well operate other airports in the system required to serve the growing needs of the two cities and other communities in the immediately adjoining area for the benefit of all, and probably at a substantial saving to everyone concerned."

He contended that if such results could be obtained, improved service should result to both cities consistent with their growth requirements, and "unquestionably better service than can be rendered to each community on a competitive basis as at present."

Speaking for the Board, Gurney concluded: "We are, we feel, justifiably concerned by the continuation of this dispute at unnecessary cost to the taxpayers in payments to the carriers having subsidy requirements, to the larger, self-sufficient airlines on higher operating costs and to the traveling public in terms of conveniently available air transportation service."

▶ **Ft. Worth Proposal**—Ft. Worth went along with CAB's recommendations wholeheartedly. In addition to offering to sell half interest in the airport to Dallas and to change the name, the city said stockholders of the terminal corporation would sell half of their entire capital stock to nominees of the city of Dallas, at cost, thereby giving Dallas equal representation on the official staff and board of directors. Name of the corporation would be changed to Dallas-Ft. Worth Air Terminal, Inc.

Ft. Worth, in accordance with CAB's recommendations, also said it would join Dallas in transferring the entire airport with all operating rights and facilities to an appropriate authority when and if established.

The city added that half interest in the 1,828,000-acre airport and the terminal would cost Dallas less than $4 million.

▶ **Back Talk**—Dallas immediately made its position clear on all recommendations. In its indignant letter to Gurney, the Dallas chamber of commerce expressed the opinion that it is most unusual for the chairman of a quasi-judicial federal agency to inject himself "extra-legally" into the affairs of a community and to advance "personal" opinions that are "completely unsupported by the facts."

Dallas asked Gurney for "direct and unequivocal" answers to the following questions:

- "Did other CAB members have any knowledge of your letter of Nov. 5 to Mr. W. O. Jones (Ft. Worth city manager). If so, who were the members?"
- "If the letter simply expressed your personal opinions, why did you not make it clear that they were personal opinions unsupported by any Board procedure, any evidence of record or any official Board action?"
- "Since CAB has never taken any evidence as to the adequacy of the Ft. Worth airport to serve the air transportation needs of Dallas, whose advice did you accept in reaching your opinion?"
- "Since the only pertinent evidence the Board has received is to the effect that two of the subsidized airlines would require increased subsidies amounting to at least $875,000 per year if they cannot serve Dallas air traffic at the Dallas airport, do you intend to ask Congress to increase its appropriations to CAB so that you can pay out an additional $875,000 per year for your satisfaction in having Dallas air travelers and shippers use another city's airport?"
- "Was your letter prompted by a desire to compel the Dallas public to provide a traffic volume at the Ft. Worth airport to help justify the millions of dollars which that airport received in federal grants?"
- "Was your letter prompted by any desire to aid one of the larger, self-sufficient airlines to recoup its losses on its bad guess in expending millions of dollars in facilities and concessions at the Ft. Worth airport?"
- "Or was your letter inspired by the private corporation which holds a 36 yr. lease on the airport, and which is reportedly operating at a deficit of approximately $40,000 per month? If this be true, do you feel it ill-becoming of you to suggest that Dallas citizens do the 'bailing out?'"
- "Who advised you that "improved service will result to both cities by making Dallas air travelers and shippers buy their air transportation at a more distant airport, with the inescapably staggering costs in convenience, time and ground transportation expenses?"
- "Does the above statement imply a threat that Dallas will not get the service our traffic requires and justifies unless we accept these severe penalties of detouring to the Ft. Worth airport?"

▶ **Punitive Action**—The Dallas chamber said implicit in Gurney's entire letter is a threat of "punitive action" unless Dallas "surrenders its community rights" at Gurney's dictation.

"What form do you intend for the punitive action to take?" it demanded of the CAB chairman. "We think we are entitled to an immediate answer on this point."

In conclusion, the chamber asked: "Since Dallas has never asked for air traffic that belongs to any of our neighbors—and has confined its activities to efforts to secure air services which Dallas' own traffic requires—who convinced you that a 'dispute' or 'controversy' exists between Dallas and Ft. Worth?"

Moore Quits CAA

Phillips Moore has resigned as district airport engineer for Civil Aeronautics Administration at Miami, Fla., following an investigation of allegations that he accepted gratuities from the Dade County (Fla.) Port Authority (AVIATION WEEK Nov. 1, p. 84).

The authority controls Miami International Airport. CAA said his resignation closes the case and that "no punitive action will be sought by CAA."

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LUFTHANSA'S FIRST PLANE, a Convair 340, undergoes flight tests over San Diego prior to making a trans-Atlantic hop to Hamburg, base of the reborn German airline.

Why Lufthansa Picked Connie, 340

Big reason the newly organized West German Lufthansa decided on Convair 340s and Lockheed Super Constellations for its initial fleet was because they are aircraft "long proven in airline service."

"After more than 10 years out of the business, we couldn't afford to take a chance on more recent aircraft, such as the turboprop types," the airline's managing director and chief engineer Dipl.-Ing. Gerhard Holtje, told AVIATION WEEK in New York.

"This is not intended as criticism of the Viscount or any other recently introduced types," Holtje said. "We simply felt the need of a record of long airline operation on the type aircraft we bought in order to serve us as a guide in our own operations.

"At the time we placed our initial orders, 1951, the Viscount was still engaged in test flights with British European Airways."

Holtje also cited the shortterm delivery time as a contributing factor to the airline's selection of Convairs and Super Connies.

First of the carrier's four Convairs on order will be delivered before the end of this month.

Lufthansa hopes to begin inter-European operations with these aircraft early next year (AVIATION WEEK Oct. 11, p. 99) and plans opening of trans-Atlantic routes as soon as the Connies are delivered in the spring.

ATA Official Asks Higher Airline Profits

The need for bigger airline profits to finance new aircraft purchases, now a major airline concern, was highlighted in a speech to the eighth Air Transportation Institute of American University by Stanley Gewirtz, assistant to the president of Air Transport Assn.

"Rigid regulatory controls have been a past handicap to the accumulation of reserves," he said, "and, along with the other problems, they constitute a future handicap in the same area."

Gewirtz indicated airlines will insist on higher postage rates and higher transportation compensation before agreeing to an expansion of the air transport of three-cent surface mail at a compensation of 18 to 20 cents a ton-mile.

Copter Service Distant, Canadian Official Says

Canadians will have no scheduled interurban helicopter services for some years, Deputy Transport Minister John Baldwin told the Canadian Air Industries & Transport Assn. at Quebec.

In a policy statement, Baldwin pointed out that Canadian government policy cannot be settled until regular copter services on a self-supporting basis are closer to realization and that this is a long way off.

He said the government would not license interurban services such as those in New York and Los Angeles.

Delta-C&S Makes Bid For Northeast Route

Delta-C&S Air Lines plans to invest $12.5 million in additional flight equipment, acquire more than $820,000 in ground property and add approximately 1,500 new employes—if it is granted the extension requested for service from Atlanta to Washington to New York.

Testifying before the Civil Aeronautics Board in the southwest-northeast route case, Todd G. Cole, the airline's financial chief and vice president, said a healthy and sound air transportation system is vital to the concept of public service.

The airline executive emphasized that Delta's route application in the case will contribute to that end and stressed that the airline would operate the proposed new services in a manner that would make them an asset and not a liability to the company.

Cole added that it is a Delta-C&S policy to expand aircoach operations wherever the traffic volume makes it economically feasible. Access to the high-density northeast market is a fertile field, he said.

Cross-examination of Delta's final witness by counsel for the nine other airline applicants in the case was concluded last week. Eastern Air Lines currently is presenting its case.

Riddle Asks Go-Ahead On New Cargo Route

Riddle Airlines has applied to the Civil Aeronautics Board for a temporary exemption to fly cargo from Boston and Philadelphia to certain Florida points. The airfreight carrier is now awaiting CAB action on an application for permanent authority in the airfreight renewal case.

Specifically, Riddle wants authority to carry general commodities from Miami to Boston and Philadelphia, and perishable commodities from 12 other Florida points to Boston and Philadelphia. The requested exemption also would authorize transportation of general commodities from the two northern cities to Miami.

Riddle cites shipper needs and the lack of any current scheduled air cargo service to or from Boston or Philadelphia in support of its petition and says there is a need for cargo service to be established in time for the forthcoming tourist and holiday seasons.

According to the Riddle application, "It would be an undue burden on the shipping public from these points and adverse to the promotion and development of the air cargo industry to require that Riddle await the Board's action" on its permanent certificate.

NWA, Eastern to Start New One-Plane Flights

Northwest and Eastern Air Lines have won Civil Aeronautics Board approval for their interchange service between Minneapolis-St. Paul and Miami (AVIATION WEEK Sept. 13, p. 16) and they now plan to start one-plane flights Dec. 15.

The two airlines will offer one first-class flight daily in each direction, flying NWA Stratocruiser equipment. Eastern Super Constellations will be used in the interchange during the summer months.

The flights stop in Chicago.

British Approve S-55 for BEA Service

Here is the first of two Westland-built Sikorsky S-55 copters being delivered to British European Airways for its London Airport-Waterloo (South Bank) service scheduled to start Apr. 1. Britain's Air Registration Board recently gave the S-55 full approval for passenger, mail and cargo service. BEA will carry eight passengers and their baggage. Flights will be made eight times daily in each direction. Time is about 18 min., compared with more than an hour by surface transport from London Airport to Waterloo.

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P-4632, Aviation Week
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CAB ORDERS

(Nov. 11-17)

GRANTED:

American Airlines, city of Cincinnati and the chamber of commerce of Toledo, Ohio, leave to intervene in the application of Delta-C&S Air Lines to add Ft. Wayne, Ind., to Route 54.

DEFERRED:

Aero Finance Corp.'s motion for a new hearing in the company's enforcement proceeding until after oral arguments in the case.

APPROVED:

Intercompany agreements involving Northwest and Frontier Airlines and various other carriers.

International Air Transport Assn. resolutions relating to rate matters adopted at traffic conference meetings, subject to certain conditions.

SHORTLINES

► **Avianca,** Colombia National Airways, now operates only Lockheed Constellations on aircoach flight from New York to Jamaica and South America.

► **British Overseas Airways Corp.** will increase flights between Miami and Jamaica to three each week effective Dec. 17.

► **Capital Airlines** has sent chief engineer Lan Caldwell to England as its resident representative to carry out liaison activities in connection with its purchase of 40 Vickers Viscount transports.

► **KLM Royal Dutch Airlines** has started its winter schedule, featuring both first-class and aircoach departures daily from New York to European points.

► **National Airlines** will inaugurate its lowcost, in-season "package vacation" program to Miami Beach Jan. 4. . . . NAL increased available seat-miles 33% during the three-month period ended Sept. 30, while the cost per seat-mile dropped from 3.35 cents to 3.14 cents.

► **Trans World Airlines** for the sixth consecutive year has started an international exchange program to familiarize supervisory employes with TWA's operation in the U. S. and overseas.

► **Swissair** plans eight conducted ski tours to Switzerland during the winter season. Prices start at $578 for a two-week European tour, including air travel.

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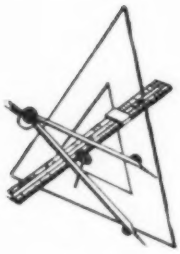

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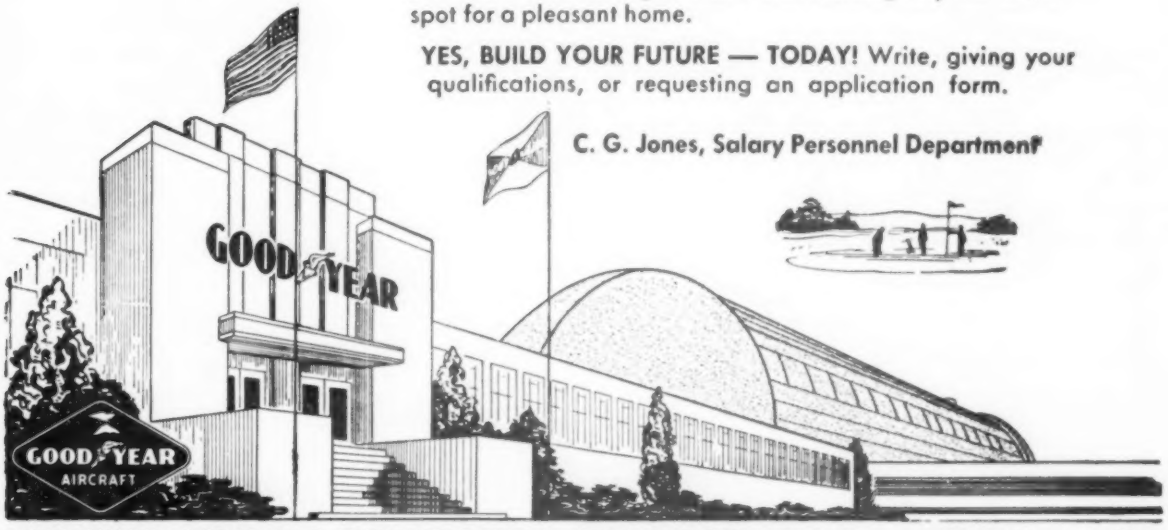

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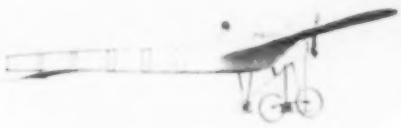

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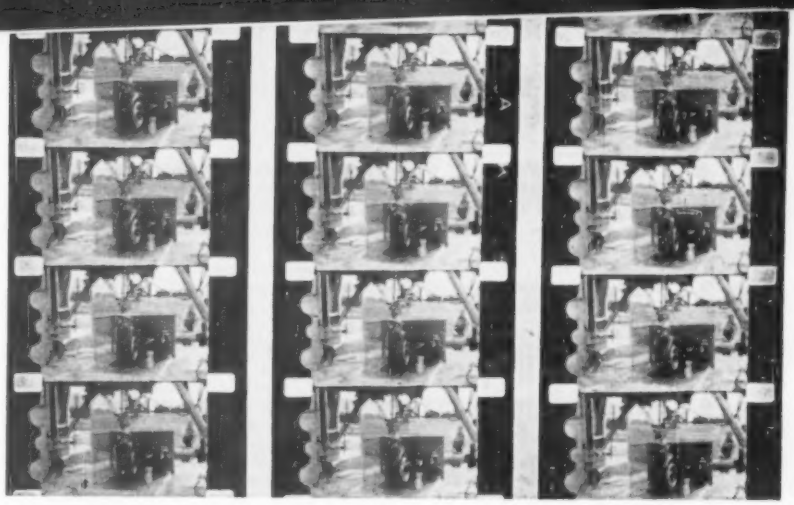

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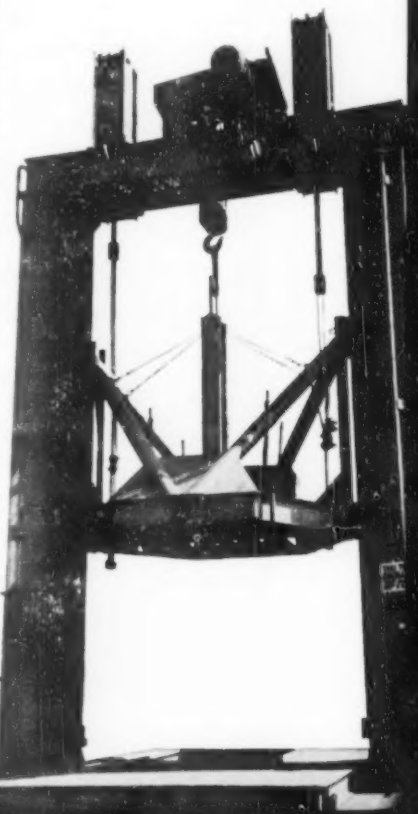

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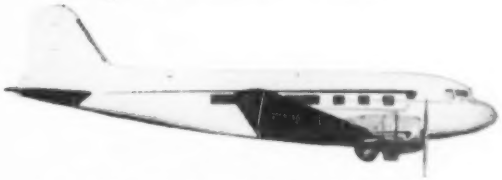

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(Reprinted from British European Airways Magazine)

The 'New Look' in Flealine

We in Flealine believe in progress. With the continued expansion of our airline, and the introduction of bigger and faster aircraft types to succeed to famous "Recovery" class, we have felt that the moment is ripe to overhaul the command system in our aircraft and introduce one more appropriate to the present day and age, and titles more in keeping with our new and expanded importance.

▶ Command Setup—Overall command, of course, will remain in the hands of the Captain, but his title will be revised to that of "Controller of Movement." Under him there will be a small executive committee, to be known as the "Prophets Committee," in whose hands will be the minute-to-minute running of the aircraft, thus relieving the Controller of Movement of all or most of the routine work.

The members of this committee will be the First Officer ("Flight Manager"), the Radio Officer ("Communications Manager"), and the four engineers ("Manager, Port Outer"; "Manager, Port Inner"; "Manager, Starboard Outer"; and "Manager, Starboard Inner").

▶ Steering Committee—Cabin service will remain in the hands of the Steward and Stewardess, whose titles will now be "Catering Superintendent" and "Passenger Service Superintendent" respectively. The latter will have a secondary function in that she will take the chair in a small committee elected from among the passengers, to be known as the "Steering Committee."

All navigational matters will be decided by this Committee, the necessity for which arose from our new supersonic reservations machine. This machine has never made a mistake in the number of passengers booked on a given service, but has shown an inexplicable partiality for confusing destinations.

It has often happened that passengers for five or six different destinations have found themselves on the same aircraft, and there has been much good-humoured banter when passengers for Basingstoke have found themselves in Biggleswade, or those for Lowestoft at Littlehampton.

▶ Democratic Rule—The first duty of the Committee is to discover the destination to which the majority of passengers wish to proceed, and, having reached a reasonable and democratic decision, to devise ways and means of attaining it. We feel that this new and stimulating procedure will minimise the complaints of those passengers unavoidably conveyed to the wrong destination, and indeed we already have reason to believe that it will prove exceedingly popular with the general public.

We must not expect miracles, however, and it will take a few weeks before our new system is thoroughly "run in." Meanwhile we must expect to encounter some difficulties, and it is our duty to do all in our power to overcome them.

During a training flight the other day it became necessary to feather the port inner engine. Manager, Port Inner, however, refused to feather his engine unless the other three were also feathered, as he said it might give rise to invidious comparisons. The Prophets Committee met and decided that, in the best interests of the aircraft, this must in fact be done, as otherwise the port inner would catch fire. All four engines were therefore feathered, but by this time it was too late, as the port inner was already on fire. The aircraft was considerably damaged in the subsequent forced landing, but in all other respects the experiment was a complete success.

We must not allow minor set-backs of this nature to discourage us.

* * *

Wright Air Development Center asks if we will publicize their "urgent need" for 20 aeronautical engineers, salaries ranging from $3,410 to $8,360. Write L. L. Wagner, Civilian Personnel Division, WADC, Wright-Patterson Air Force Base, Ohio. . . . **An RCAF association wing** has been organized in New York by John Scherer, Mechanix Illustrated, 67 W. 44th St. . . . **The de Havilland Gazette** says "the trouble about planning tourist versions is that it's always so difficult to make them more uncomfortable than first-class." . . . **A modern fighter pilot's flight suit** weighs 60 lb. more than Sir Lancelot's 84 lb. of knightly armor, including weapons, according to the U. S. Marine Corps' Air Training Command publication, Alert. . . . **There now are 11** U. S. women officially certificated as helicopter pilots, according to AIA, whose Jean Ross Howard of its Helicopter Council is the most recently licensed. . . . **According to Chemical Week magazine,** studies reveal that really rough travel will make nine out of 10 persons ill, while moderately turbulent motion upsets from 10% to 30% of inexperienced travelers.

AVIATION CALENDAR

Dec. 7—Formal dedication of Felker Heliport, Ft. Eustis, Va., Transportation Training Command's heliport for large transport helicopters.

Dec. 16—Air Force Assn., air logistics conference, Andrews AFB, Camp Springs, Md.

Dec. 17—Wright Day Dinner, Statler Hotel, Washington, D. C.

Dec. 17—Institute of the Aeronautical Sciences, 18th Wright Brothers Lecture, U. S. Chamber of Commerce Building, Washington, D. C.; to be repeated Dec. 20 in Los Angeles and Dec. 22 in Cleveland. Lecturer: Bo Lundberg, director of Sweden's Aeronautical Research Institute.

Dec. 28-29—National Science Foundation, fourth Conference on Scientific Manpower, Berkeley, Calif.

Jan. 10-14—Society of Automotive Engineers, annual meeting and engineering display, Sheraton-Cadillac and Hotel Statler, Detroit.

Jan. 19-23—Miami International Aerorama, Miami (Fla.) International Airport.

Jan. 24-27—American Meteorological Society, 135th national meeting, New York.

Jan. 24-27—Plant Maintenance & Engineering Show and three-day conference, International Amphitheatre, Chicago.

Jan. 24-28—Institute of the Aeronautical Sciences, 23rd annual meeting and Honors Night Dinner, Hotel Astor, New York.

Jan. 27-28—Southern California Meter Assn., fourth annual Instrument Short Course, Los Angeles Harbor Junior College, Wilmington, Calif.

Jan. 31-Feb. 4—American Institute of Electrical Engineers, winter general meeting, Hotel Statler, New York.

Feb. 8-10—Society of the Plastics Industry, 10th Reinforced Plastics Division Conference, Hotel Statler, Los Angeles.

Feb. 20-22—Institute of Surplus Dealers, trade show and convention, 212th AAA Armory, New York.

Mar. 11—Institute of the Aeronautical Sciences, National Flight Propulsion Meeting (restricted), Hotel Carter, Cleveland.

Mar. 14-16—Society of Automotive Engineers, production meeting and forum, Netherland Plaza, Cincinnati.

Mar. 14-17—American Society of Tool Engineers, 1955 annual meeting, Shrine Auditorium and Exposition Hall, Los Angeles.

Mar. 21-24—Institute of Radio Engineers, national conference, Waldorf-Astoria Hotel and Kingsbridge Armory, New York.

Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Exposition and Congress, Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.

Mar. 31-Apr. 1—Symposium on Boundary Layer Effects in Aerodynamics, Britain's National Physical Laboratory, Teddington, England.

Apr. 18-21—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aeronautic Production Forum and Aircraft Engineering Display, Hotel Statler and McAlpin Hotel, New York.

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LETTERS

Crashes & the Public

I am moved to comment on the column entitled "Scare Movie" in AVIATION WEEK of July 26, describing Warner Brothers' aviation film, "The High and the Mighty," which your reviewer believes could lead a person ". . . . to the conclusion never to fly again."

Unfortunately, this review represents a complete retrogression to the fear-thinking of the air transport industry in the 1930s. In those days, when a single airline disaster hurt passenger sales for months afterwards, the young and struggling air transport industry's fear of air crash publicity was at least understandable; it shocked existing and potential air passengers back to the railroads; it frightened away banks and private investors, and was strong enough to bankrupt an airline.

This economic fear of crash publicity resulted in airlines unofficially condoning, public relationwise, actions and attitudes connected with suppressing news coverage of air crashes that today would be inept, self-damaging and illegal. It sanctioned the silly practices of painting out airline insignia at wreckage sites from news photographers who, not infrequently, had their cameras smashed in altercations with over-zealous airline employes. It developed, inevitably, a censorship attitude toward all books, radio plays and movies that featured an airline crash scene. It was even reflected—until well after World War II—by the aviation trade publications which meticulously refrained from reporting news of crashes. AVIATION WEEK's leadership in correcting this ostrich-headed policy, and in periodically printing major CAB accident reports in full, is to be commended.

Nevertheless, the censorship approach to the facts of flight is an aviation custom difficult to change. Moviewise, this was best demonstrated in 1948-49 when the industry became frightened by an announcement from Universal-International Pictures that it would film a story, conceived by Universal director Jerry Bresler, concerning the crash of an airliner and how the cause of the accident was found by CAB accident investigators (AVIATION WEEK Oct. 11, 1948). The script followed the documentary style of the FBI movie series and was not only technically correct—being based on CAB public accident reports—but emphasized the way the industry and the government work together to make American air transportation the safest in the world. Then, only a few days before Universal was to start its shooting schedule, Jerry Bresler announced that the picture had been "killed" because of (airline) "industry fear."

To an industry that is now an integral part of the American transportation economy and that in 1953 carried more than 31 million passengers, employed more than 106,000 people and had a net worth exceeding $536 million, continued unreasonable fear of air crash publicity can be as ill-becoming as it is unwarranted. Your reviewer stated that "several airline officials admit that the picture ('The High and the Mighty') could have adverse effects." He quoted an unidentified airline official as saying: "The book was damaging enough—but a motion picture with a top rating will be seen by a large segment of the population. It could hurt!"

Well, let's see exactly how much it hurts. Financial losses connected with an air crash involving a certificated airline are fully covered by insurance and the premium cost of such insurance has long since been stabilized as an annual operating expense by all airlines. Therefore, the only large tangible economic "hurt" caused by air crash publicity—and so feared by the unnamed airline official—must be an abrupt dropoff in passenger revenues and number of passengers carried. If so, then the worst cumulative air crash publicity in American air transport history, which occurred during a 57-day period in 1951-52 when three airliners crashed successively at Elizabeth, N. J., causing a total of 119 deaths, including 11 people on the ground, should have resulted in severe economic damage to the three airlines involved and had "adverse effects" on the entire domestic air transport industry.

In spite of the unique trilogy of crashes at Elizabeth, the first and most significant fact of flight is that the total airline revenues earned and the total number of air passengers carried domestically in 1952 **increased** substantially over 1951; secondly, that the two certificated airlines involved in the Elizabeth crashes both recovered from the temporary slump in revenues and passengers carried, ending up 1952 considerably ahead of 1951.

Miami Airlines, the large irregular air carrier involved in the Elizabeth accidents, operated throughout 1952 with one less airplane than during the previous year and therefore earned less revenue and carried fewer passengers, but this decrease was not strong enough to prevent a yearly **increase** in passengers carried by the large irregular air carriers in 1952.

In the case of American Airlines, the dropoff in revenues and passengers carried after the Elizabeth crash was quickly followed by a strong increase in both, with the fourth quarter of 1952 well ahead of the same quarter in 1951. Yearly gains by American in revenue were considerable, while passenger gains increased comfortably over 1951.

In the case of National Airlines at Elizabeth, a carrier with a marked Florida seasonal traffic, the fourth quarter of 1952, while exceeding the fourth quarter of 1951 in both revenue and passengers carried, did not regain the 1952 first quarter high in either category. However, a comfortable yearly gain in revenue and a moderate gain in passengers was attained in 1952 over 1951.

In the final analysis, the Elizabeth air crash publicity was unable to stop the steady growth of the domestic air transport industry, which—except for the war years when half its fleet was turned over to the military—has earned increased revenue and carried more passengers each year since 1926. Indeed, American Airlines' 1952 net profit of $12,729,000 was $2,313,345 greater than in 1951; and National's 1952 net profit of $3,592,000 was $546,443 greater than in 1951. Perhaps the effects of the three Elizabeth disasters on revenue and traffic can be summed up conservatively by saying that the unprecedented air crash publicity of 1952 probably caused the air transport industry some percentage of decrease in the annual percentage of increase.

Before closing, I must take exception also to your reviewer's flat statement that: "To those in the industry the story ('The High and the Mighty') is loaded with too many improbabilities to be taken seriously." In the files of the CAB in Washington there are dozens of public accident reports from which author-airline captain Ernie Gann could have adopted his story; at least two of these cases are very similar and one of them (**File-1-0091, between Honolulu and Wake Island, Dec. 6, 1953, obtainable from the Office of Public Information, Civil Aeronautics Board, Washington 25, D. C.**) occurred in the Pacific several months **after** Ernie Gann's aeronautically accurate and dramatically interesting book was published.

Finally, I am puzzled by your reviewer's opening statement: "The air transport industry has a public relations problem on its hands with 'The High and the Mighty.'" If there is such a problem—and the financial and traffic facts of flight set forth do not support this postulation—how is it to be handled? What does the maritime or railroad industry do when a book or a movie has the temerity to feature a sinking ship or a derailed train?

Fortunately, the American public's acceptance of water, rail and air transportation makes it unnecessary to do anything. In the airline business today, America has a transportation utility that has become a necessity to modern trade and travel and military defense.

It has come a long way since the 1930s—and most airlines now have an informed and effective public relations department, so informed and so effective that they will realize that in this picture they have no public relations problem.

EDWARD E. SLATTERY, JR.
Chief
Office of Public Information
Civil Aeronautics Board
Washington 25, D. C.

(We thank Ed Slattery but remind him that our reviewer was quoting the movie critic of the New York Herald Tribune, one of the nation's leading dailies, who wrote in his review: "You may decide never to step into an airplane again after seeing 'The High and the Mighty.'" Similar comments appeared in other newspaper reviews. We too protest such "fear-thinking" and believe reader Slattery was really addressing his protest to those newspapermen and airline officials who feel this way.—Ed.)

Ramo-Wooldridge

Dr. Wooldridge, president of the Ramo-Wooldridge Corp., has requested that we ask you for permission to reprint in a 4-page folder the story on Ramo-Wooldridge, "New Avionics Team Makes Fast Start," by Philip Klass, that appeared in your Oct. 11 issue.

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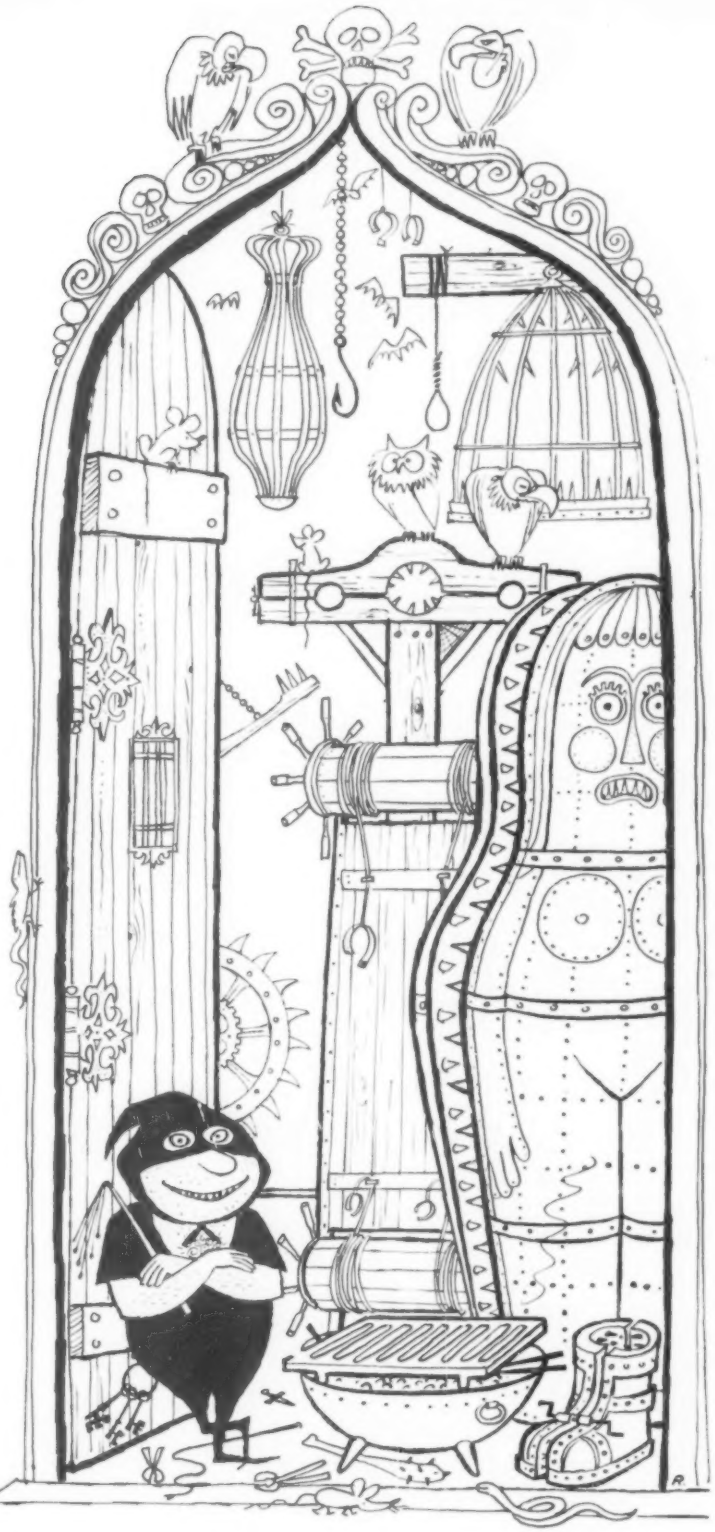

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